





ANNUAL REPORT

OF THE

BOARD OF REGENTS

OF THE

SMITHSONIAN INSTITUTION,

SHOWING

THE OPERATIONS, EXPENDITURES, AND CONDITION
OF THE INSTITUTION

FOR THE

YEAR ENDING JUNE 30, 1888.

REPORT OF THE U. S. NATIONAL MUSEUM.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1890.

FIFTY-FIRST CONGRESS, FIRST SESSION.

Concurrent resolution adopted by the House of Representatives May 27, 1890, and by the Senate June 17, 1890.

Resolved by the House of Representatives (the Senate concurring), That there be printed of the report of the Smithsonian Institution and National Museum for the years ending June 30, 1888, and June 30, 1889, in two octavo volumes for each year, 16,000 copies; of which 3,000 copies shall be for the use of the Senate, 6,000 for the use of the House of Representatives, and 7,000 for the use of the Smithsonian Institution.

REPORT
OF THE
U. S. NATIONAL MUSEUM,
UNDER THE DIRECTION OF
THE SMITHSONIAN INSTITUTION,
FOR THE
YEAR ENDING JUNE 30, 1888.

REPORT OF THE U. S. NATIONAL MUSEUM FOR THE YEAR END-
ING JUNE 30, 1888.

SUBJECTS.

- I. Report of the Assistant Secretary of the Smithsonian Institution,
in charge of the National Museum, upon the condition and
progress of the Museum.
- II. Reports of the Curators.
- III. Papers illustrative of the collections in the U. S. National Museum.
- IV. Bibliography.
- V. List of accessions.

U. S. NATIONAL MUSEUM,
UNDER DIRECTION OF THE SMITHSONIAN INSTITUTION,
Washington, August 1, 1888.

SIR: I have the honor to submit herewith a report upon the present condition of the U. S. National Museum and upon the work accomplished in its various departments during the fiscal year ending June 30, 1888.

Very respectfully,

G. BROWN GOODE,
Assistant Secretary, in charge U. S. National Museum.
Prof. S. P. LANGLEY,
Secretary, Smithsonian Institution.

CONTENTS.

	Page.
SUBJECTS.....	V
LETTER OF TRANSMITTAL.....	VII
TABLE OF CONTENTS.....	IX
LIST OF ILLUSTRATIONS.....	XIII
SECTION I.—REPORT OF THE ASSISTANT SECRETARY, IN CHARGE OF THE NATIONAL MUSEUM.	
A.—General considerations.....	3
Early history of the Museum.....	4
Progress in the work of the Museum.....	5
Necessity for a National Museum.....	6
Possibilities of the future.....	7
Possibilities of increase and improvement.....	7
The necessity for a new Museum Building.....	10
Appreciation by foreign nations.....	11
The relations of the Museum to the Smithsonian Institution.....	12
The educational work of the Museum.....	16
B.—Organization and scope of the Museum.....	17
C.—Special topics of the year.....	19
The Cincinnati Exhibition.....	19
The proposed statue to Professor Baird.....	19
The Capron collection.....	19
Increasing growth of the collections.....	19
Rearrangement of the exhibition halls.....	19
Transfer of disbursements from the Department of the Interior.....	20
The collection of living animals.....	20
D.—The condition of the collections.....	20
Increase of the collections.....	20
Census of the collections.....	21
Catalogue entries.....	23
Installation of collections and assignment of space.....	24
E.—The Museum staff.....	26
The scientific staff.....	26
The administrative staff.....	28
F.—Review of work in the scientific departments.....	28
Arts and industries.....	29
Ethnology.....	30
American aboriginal pottery.....	31
Prehistoric anthropology.....	31
Mammals.....	32
Birds.....	32
Birds' eggs.....	33
Reptiles and batrachians.....	33

	Page.
F.—Review of work in the scientific departments—Continued.	
Fishes.....	34
Mollusks.....	35
Insects.....	35
Marine invertebrates.....	36
Comparative anatomy.....	36
Paleozoic invertebrate fossils.....	37
Mesozoic invertebrate fossils.....	37
Fossil and recent plants.....	37
Minerals.....	38
Lithology and physical geology.....	38
Metallurgy.....	39
Living animals.....	40
G.—Review of the administrative work.....	40
Progress of general and incidental work.....	40
Library.....	40
Transportation and storage.....	44
Distribution of duplicates and exchanges.....	44
Foreign exchanges.....	46
Publications.....	47
Visitors.....	49
Lectures and meetings of societies.....	50
Students.....	51
Current administrative work.....	53
Buildings and labor: Police and public comfort.....	53
Electric service.....	55
Telephone service.....	55
Property and supplies.....	55
Finances.....	56
Preservation of collections.....	56
Furniture and fixtures.....	56
Heating and lighting.....	57
Correspondence and reports.....	57
Preparation of labels.....	59
The work of the Museum preparators.....	60
(a) Taxidermists and modelers.....	60
Taxidermy proper.....	60
Miscellaneous work.....	62
Modeling and painting.....	63
(b) Osteological preparator.....	64
(c) Photographer.....	65
(d) Colorist.....	65
(e) Preparator in the department of arts and industries.....	65
H.—Geographical review of the more important accessions.....	66
Africa.....	66
America.....	66
British America.....	66
Central America.....	67
Danish America.....	67
Mexico.....	67
United States.....	67
West Indies.....	73
South America.....	74
Asia.....	74
Europe.....	74

	Page.
H.—Geographical review of the more important accessions—Continued.	
Oceanica	75
Australasia	75
Malaysia	75
Polynesia	75
I.—Co-operation of the Departments and Bureaus of the Government.....	76
Department of State	76
Treasury Department.....	76
War Department	77
Navy Department	79
Interior Department.....	79
U. S. Fish Commission.....	79
U. S. Geological Survey	80
J.—Explorations	81
K.—Report upon the participation of the Smithsonian Institution in the Industrial Exposition at Minneapolis, 1887.....	82

SECTION II.—REPORTS OF THE CURATORS.

Ethnology	87
Oriental antiquities	93
American aboriginal pottery.....	105
Transportation and engineering.....	107
Materia medica.....	113
Historical relics, coins and medals.....	115
Graphic arts.....	117
Prehistoric anthropology.....	123
Mammals.....	139
Birds.....	145
Birds' eggs	151
Reptiles and batrachians	153
Fishes.....	155
Mollusks (including tertiary fossils).....	159
Insects	165
Marine invertebrates.....	173
Comparative anatomy.....	181
Invertebrate fossils:	
Paleozoic	183
Mesozoic.....	187
Fossil plants.....	189
Recent plants.....	191
Minerals.....	195
Lithology and physical geology	199
Metallurgy and economic geology	209
Living animals	213

SECTION III.—PAPERS DESCRIBING AND ILLUSTRATING THE COLLECTIONS IN THE U. S. NATIONAL MUSEUM.

1. The Coast Indians of southern Alaska and northern British Columbia. By Albert P. Niblack, ensign, U. S. Navy.....	225
2. A catalogue of the Hippiisley collection of Chinese porcelains, with a sketch of the history of the ceramic art in China. By Alfred E. Hippiisley, of the Imperial Chinese customs service	387
3. The expedition to Funk Island, with observations upon the history and anatomy of the Great Auk. By Frederic A. Lucas.....	493

	Page.
4. Fire-making apparatus in the U. S. National Museum. By Walter Hough..	531
5. The collection of Korean mortuary pottery in the U. S. National Museum. By Pierre Louis Jouy	589
6. A study of prehistoric anthropology. By Thomas Wilson	597
7. Ancient Indian matting:—from Petit Anse Island, Louisiana. By Thomas Wilson	673
8. Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age. By Thomas Wilson.....	677

SECTION IV.—BIBLIOGRAPHY OF THE U. S. NATIONAL MUSEUM DURING THE FISCAL YEAR ENDING JUNE 30, 1888.

I. Publications of the Museum	705
II. Papers by officers of the U. S. National Museum and other investigators whose writings are based directly or indirectly on Museum material..	706

SECTION V.—LIST OF ACCESSIONS TO THE U. S. NATIONAL MUSEUM DURING THE FISCAL YEAR 1887-'88.

List of accessions	737
Index by localities.....	791
Index by departments in the National Museum	805

LIST OF ILLUSTRATIONS.*

REPORT OF ASSISTANT SECRETARY.

	Page.
Museum floor-plan	26

REPORT ON DEPARTMENT OF PREHISTORIC ANTHROPOLOGY.

PLATE A. Flint implement of human manufacture; from the Equus beds, San Diego, Texas.....	126
B. Flint implement of human manufacture; from the Equus beds, San Diego, Texas.....	128
FIG. 1. Plan of cave discovered at Ballymenoch, County Down, Ireland.....	129
2. Section of cave at Ballymenoch, County Down, Ireland.....	129
FIGS. 3, 4, 5. Scrapers; from cave discovered at Ballymenoch, County Down, Ireland	131
6, 7, 8. Fish-hooks; from cave discovered at Ballymenoch, County Down, Ireland	131

THE INDIANS OF THE NORTHWEST COAST.

PLATE	I. General view of Kasa-an Village, Prince of Wales Island, Alaska	231
	II. View of the eastern part of Kasa-an Village, Prince of Wales Island, Alaska.....	236
	III. View of the western part of Kasa-an Village, Prince of Wales Island, Alaska.....	236
	IV. Chief Kitkun of the Haida village of Las Keek, Queen Charlotte Islands, British Columbia.....	256
	V. Haida tattooing	256
	VI. Ancient and modern metal ornaments from the northwest coast	260
	VII. Bone and shell ornaments from the northwest coast.	260
	VIII. General modern type of Haida, Tsimshian and Tlingit silver bracelets	262
	IX. General type of Tsimshian, Haida and Tlingit chief's costume	264
	X. Details of chief's costume shown in Plate IX.....	264
	XI. Modern Tlingit male and female costumes.....	266
	XII. Hats of twined grass and spruce-root from the northwest coast	266
	XIII. Wooden helmets and cuirass, or body armor.....	270
	XIV. Tlingit wooden armor.	270

* The drawings from photographs and specimens in the Museum were made by Messrs. W. H. Chandlee and W. H. Burger. The reproductions of photographs in half tone were made by the Meissenbach process in the hands of the Photo-Engraving Company of New York City, by whom the other photo-relief engravings were also made.

	Page.
PLATE XV. Wooden and leather body armor.....	270
XVI. Ceremonial dance paraphernalia.....	272
XVII. Chief and Shaman ceremonial batons.....	272
XVIII. Red-cedar bark paraphernalia from the northwest coast, and ancient rattle	272
XIX. Chief's blue cloth ceremonial vestment.....	272
XX. Carvings on rocks and stone implements from the north- west coast.....	274
XXI. Tlingit ceremonial buckskin shirt	274
XXII. Primitive stone implements from the northwest coast, with wooden wedge for splitting wood	278
XXIII. Primitive stone and modern steel implements; from the northwest coast	280
XXIV. Industrial implements or tools—knives from the northwest coast.....	280
XXV. Copper and steel daggers, with sheaths of buckskin and moose-hide.....	284
XXVI. Tlingit and Haida bows and Tlingit war-spear.....	286
XXVII. Weapons of war and of the chase.....	286
XXVIII. Weapons of war and of the chase—clubs.....	288
XXIX. Haida and Tlingit hunting and fishing implements.....	288
XXX. Fishing implements from the northwest coast.....	290
XXXI. Fish-hooks from the northwest coast	290
XXXII. Drag and dip nets; paddles; details of netting and basket weaving	292
XXXIII. Models of general types of hunting and fishing canoes; from the northwest coast	296
XXXIV. Family or transportation canoes used on the northwest coast	296
XXXV. Details of Haida house construction, with types of fronts found elsewhere on the northwest coast.....	306
XXXVI. Tlingit and Haida basket-work	314
XXXVII. General type of Haida and Tlingit open-work twined basketry	314
XXXVIII. Tlingit ceremonial and household food-dishes	316
XXXIX. Types of wooden household utensils from the northwest coast.....	316
XL. Food dishes from the northwest coast.....	316
XLI. Horn and whalebone spoons and dishes from the northwest coast	318
XLII. Wooden spoons from the northwest coast.....	318
XLIII. Household box; also used as a depository for the cremated ashes of the dead	318
XLIV. Haida carved box of black slate; from Queen Charlotte Isl- ands, British Columbia	318
XLV (A and B). Paint-brushes from the northwest coast.....	320
XLVI. Slave-killers from the northwest coast; formerly used in de- spatching slaves	320
XLVII. Slate carvings; from Queen Charlotte Islands, British Co- lumbia.....	322
XLVIII. Pipes from the northwest coast. Haida slate dish	322
XLIX. Haida slate-carving, representing the "Bear-mother".....	322
L. Haida slate-carving representing the "Bear-mother".....	322
LI. Chests, carvings, etc., from the northwest coast	322
LII. Haida legendary drawings, or pictographs.....	322
LIII. Carved wooden ceremonial rattle from the northwest coast	324
LIV. Ceremonial rattle from the northwest coast.....	324

	Page.
PLATE LV. Carved columns from the northwest coast; Tiki from New Zealand.....	326
LVI. Indian song; Norfolk Sound.....	330
LVII. Musical instruments from the northwest coast.....	330
LVIII. Ceremonial rattles from the northwest coast.....	330
LIX and LX. Ceremonial dance-rattles from the northwest coast.....	330
LXI and LXII. Musical instruments from the northwest coast — wooden whistles and trumpets.....	330
LXIII. Gambling sticks, mortars and carved pestle, for preparing native tobacco.....	344
LXIV. Haida mortuary and commemorative columns.....	352
LXV and LXVI. Wooden Tlingit graves, Alaska.....	352
LXVII. Mortuary display of the body of Chief Skowl inclosed in a casket and lying in state in his former residence at Kasa-an.....	360
LXVIII. The body of Chief Shakes lying in state. Also a scene from a theatrical entertainment commemorative of the legend of the alliance of Shakes with the bear family.....	360
LXIX. Wooden commemorative or mortuary columns of the Tlingit and Haida Indians.....	360
LXX. A band of Haida erecting a house at the Tsimshian village of Port Simpson, B. C., in October 1866. (From a sketch by Mr. Henry Elliott).....	374
CHART I. Northwest coast of America. From Dixon entrance to Cape St. Elias. (From chart prepared by U. S. Coast Survey).....	387
II. Northwest coast of America. From Cape Flattery to Dixon entrance. (From chart prepared by U. S. Coast Survey).....	387
FIG. 11 c. Bone comb; Tlingit. (From a specimen in the Emmons collection).....	260
11 d. Wooden comb; Tlingit. (From a specimen in the Emmons collection).....	260
11 e. Stone comb; Tlingit. (From a specimen in the Emmons collection).....	260
12 a. Ear ornament; Tlingit. (From a specimen in the Emmons collection).....	261
12 b. Ear ornament; Tlingit and Haida. (From a specimen in the Emmons collection).....	261
16 b. Iron bracelet; Tlingit. (From a specimen in the Emmons collection).....	262
21 a and b. Bone awls; Tlingit. (From specimens in the Emmons collection).....	263
46. Detail of weaving Tlingit armor. (Drawn from a specimen in the National Museum, collected by J. J. McLean).....	269
75. Shaman's cloak; Skidegate. (Drawn from a specimen in the National Museum, collected by James G. Swan).....	273
75 a. Ceremonial shirt; Skidegate. (Drawn from a specimen in the National Museum, collected by James G. Swan).....	274
75 b. Rear view of Fig. 75 a.....	274
99 a and b. Stone-bladed knives; Haida. (From the Emmons collection).....	280
79 k. Bone skin scraper; Tlingit. (From a specimen in the Emmons collection).....	281
83 a. Paint pestle; Tlingit. (From a specimen in the Emmons collection).....	281

	Page.
Fig. 78. Chisel. (From a specimen in the Emmons collection).....	282
122 a. Stone war-club; Tlingit. (From a specimen in the Emmons collection).....	283
108 b. Stone dagger; Tlingit. (From a specimen in the Emmons collection).....	284
108 c. Stone-bladed dagger; Tlingit. (From a specimen in the Emmons collection).....	284
108 d and e. Steel daggers; Tlingit. (From a specimen in the Emmons collection).....	285
108 f. Ivory guard for dagger point; Tlingit. (From a specimen in the Emmons collection).....	286
108 g. Ivory guard for dagger; Tlingit. (From a specimen in the Emmons collection).....	286
108 h. Steel-bladed dagger; Tlingit. (From a specimen in the Emmons collection).....	286
126 a, b and c. Bone arrow-heads; Tlingit. (From specimens in the Emmons collection).....	287
137 e. Bone spear-head; Tlingit. (From a specimen in the Emmons collection).....	289
149 a. Salmon gig; Tlingit. (From a specimen in the Emmons collection).....	289
150 a. Salmon spear-head; Tlingit. (From a specimen in the Emmons collection).....	290
140 a, b, and c. Powder-horn and chargers; Tlingit. (From specimens in the Emmons collection).....	300
145 a and b. Bone trap sticks; Tlingit. (From specimens in the Emmons collection).....	302
179 l. Bark-scraper; Tlingit. (From a specimen in the Emmons collection).....	312
179 m. Bark-beater; Tlingit. (From a specimen in the Emmons collection).....	312
185. Coiled basket; Tinné. (Drawn from a specimen in the National Museum, collected by John J. McLean).....	314
186. Detail of Fig. 185.....	314
187. Haida basket, set up; Massett. (Drawn from a specimen in the National Museum, collected by James G. Swan).....	315
188. Details of Fig. 187.....	315
189. Twined and embroidered basket wallet; Chilkat. (Drawn from a specimen in the National Museum, collected by Dr. J. B. White, U. S. A.).....	316
278, 279, 296 and 297. Carvings on rocks; Sitka. (From sketches by the author.).....	321
300. Song of the Haida. (From Poole.).....	330

EXPEDITION TO FUNK ISLAND.

PLATE	LXXI. Sketch map of Funk Island.....	506
	LXXII. The Great Auk.....	529
	LXXIII. Egg of the Great Auk.....	529
	Diagram showing the length and breadth of sixteen skulls of the Great Auk..	517
	Diagram showing the measurements of three hundred humeri of the Great Auk..	521
	Diagram showing the measurements of two hundred femora of the Great Auk..	522
	Diagram showing the measurements of two hundred tibiae of the Great Auk..	522

FIRE-MAKING APPARATUS.

	Page
PLATE LXXIV. Figs. 21, 22. Fire-making set and extra hearth; Frobisher Bay; Fig. 23. Moss in a leathern case; Fig. 24. Boring-set; Cumberland Gulf.....	556
LXXV. Fig. 27. Fire-bag; Holsteinberg, West Greenland.....	560
LXXVI. Fig. 32. Boring-set; Point Barrow, Alaska.....	564
LXXVII. Fig. 33. Drilling-set; Sledge Island, Alaska.....	564
LXXVIII. Fig. 36. Fire-making set; Chalitmute, Alaska.....	566
LXXIX. Fig. 37. Fire-making set, Kassianamute, Alaska.....	566
LXXX. Fig. 40. Fire-making set, Bristol Bay, Alaska.....	568
LXXXI. Fig. 57. Strike-a-light. Flint, steel, tinder-box, and rush-pouch, Yezo, Japan.....	584
FIG. 1. Fire-making set, Tlingit, Sitka, Alaska.....	535
2. Fire-making set, Bella-Bella, British Columbia.....	535
3. Fire-making set and slow match, Quinalelt, Washington.....	535
4. Fire-making set, Klamath, Oregon.....	536
5. Fire-making set, Hupa, California.....	536
6. Fire-making set, Washoe, Nevada.....	538
7. Fire-making set, Pai-ute, southern Utah.....	538
8. Fire-making set, Pai-ute, southern Utah.....	539
9. Fire-making set, Shoshone, Wind River, Wyoming.....	539
10. Fire-making set, Moki, Arizona.....	541
11, 12. Fire-making set and slow match, Zuñi, New Mexico.....	541
13. Lower stick of fire-making set, from a cave at Silver City, New Mexico.....	542
14. Lower piece of fire-making set, Apache, Arizona.....	542
15. Fire-making set, Navajo, New Mexico.....	543
16. Fire-making set, Talamanca, Costa Rica.....	544
17. Fire-making set with touchwood, Ainos, Yezo, Japan. (Lent by Peabody Museum, through Prof. F. W. Putnam).....	551
18. Sacred fire drill. (From photograph of specimen in Tokio Museum, lent by Romyn Hitchcock).....	552
19. Fire-making set; Somalis, E. Africa. (Lent by Peabody Museum through Prof. F. W. Putnam).....	553
20. Taveita Africans making fire. After H. H. Johnston. (See Jour. Soc. Arts, June 24, 1887).....	553
25. Fire-making set, Angmagsalik Eskimo, E. Greenland. Copied from G. Holm's <i>Ethnologisk af Angmagsalikerne</i> , 1887.....	558
26. Boring set. Angmagsalik Eskimo, E. Greenland. Holm and V. Garde. Preliminary report of the Danish Umiak Expedition in the Arctic, page 208.....	559
28. Lower part of fire-making set, Mackenzie River, British Columbia.....	560
29. Lower part of fire-making-set, Mackenzie River, British Columbia.....	560
30. Fire-making set, Anderson River, British Columbia.....	561
31. Fire-making set, Point Barrow, Alaska.....	562
34. Fire-making set, Norton Sound, Alaska.....	564
35. Lower piece of fire-making set, Cape Vancouver, Alaska.....	564
38. Fire-making set, Koggiung, Bristol Bay, Alaska.....	566
39. Fire-making set, Koggiung, Bristol Bay, Alaska.....	567
41. Lower piece and spindle of fire-making set, Kadiak Island Alaska ...	568
42. Malay fire-sticks. (Models in bamboo made by Mr. Hough, after Prof. A. R. Wallace's description. The Malay Archipelago, page 332). ..	569
43. Fire-making sticks, Samoa. (Deposited by Harold M. Sewall).....	570

	Page.
FIG. 44 (a) Strike-a-light, Seven Barrows, Berks County, England. (From Lubbock's <i>Early Man in Britain</i> , page 258). (b) Strike-a-light, Fort Simpson, Mackenzie River District, British Columbia.....	573
45. Tinder pocket and fire bag, Mackenzie River District, British Columbia	574
46. Pyrites and flint striker, Mackenzie River District, British Columbia..	574
47. Method of using the strike-a-light. (Drawing by W. H. Burger).....	575
48. English tinder-box, England	578
49. Wheel tinder-box, Broadalbin, New York. (Presented by F. S. Hawley)	578
50. Strike-a-light, Boulogne-sur-mer, France	579
51. Flint and steel, Otoe, Kansas and Nebraska.	580
52. Strike-a-light, Cheyenne, Arkansas.....	581
53. Strike-a-light, Comanche, Texas	582
54. Flint and steel, Guadalajara, Mexico.....	583
55. Smokers' pipe-lighting outfit, eastern Turkey.....	583
56. Strike-a light, China. (Gift of George G. Fryer).....	583
58, 59. Tinder-box, Tokio, Japan. (Gift of the Japanese Department of Education)	584
60. Smokers' strike-a-light, Tokio, Japan. (Gift of the Japanese Department of Education)	585

KOREAN MORTUARY POTTERY.

PLATE LXXXII. Mortuary vessels from Korea.

(Upper line, commencing at the left.)

- FIG. 1. Earthen pot-shaped vessel on stand, with cover. Slate-colored ware.
2. Earthen pot. Brownish gray ware, washed with a slate-colored slip.
 3. Earthen pot and cover. Dark brown ware, unglazed.
 4. Earthen bowl on stand. Grayish brown ware, unglazed outside.
 5. Earthen pot. Gray ware, glazed.

(Lower line, commencing at the left.)

- FIG. 1. Earthen pot. Slate-colored ware, unglazed.
2. Earthen pot. Dark brown ware.
 3. Earthen pot. Brown ware, glazed.
 4. Earthen pot. Yellowish gray ware, washed with a brown slip, if not glazed.
 5. Earthen pot. Gray ware, unglazed.

PLATE LXXXIII. Mortuary vessels from Korea.

(Upper line, commencing at the left.)

- FIG. 1. Earthen pot. Slate-colored ware, unglazed.
2. Earthen pot. Brown ware, glazed.
 3. From photograph of specimen in the collection of P. L. Jouy.
 4. Earthen pot. Brown ware, unglazed.
 5. Earthen jar on stand. Slate-colored ware, unglazed.
 6. From photograph of specimen in the collection of P. L. Jouy.
 7. Earthen bowl. Slate-colored ware, washed with a yellow slip and lightly fired; unglazed.

PLATE LXXXIII. Mortuary vessels from Korea—Continued.

(Lower line, commencing at the left.)

- FIG. 1. From photograph of specimen in the collection of P. L. Jouy.
 2. From photograph of specimen in the collection of P. L. Jouy.
 3. From photograph of specimen in the collection of P. L. Jouy.
 4. Earthen bowl on stand. Brown ware, washed with a brown slip.
 5. From photograph of specimen in the collection of P. L. Jouy.

PLATE LXXXIV. Mortuary vessels from Korea.

(Upper line, commencing at the left.)

- FIG. 1. Earthen cup on a stand. Slate-colored ware, unglazed, and well fired.
 2. Earthen tazza with cover. Slate-colored ware, unglazed.
 3. Earthen bowl on stand with cover. Slate-colored ware, unglazed.
 4. From photograph of specimen in the collection of P. L. Jouy.
 5. From photograph of specimen in the collection of P. L. Jouy.
 6. Earthen tazza, without handles. Slate-colored ware.

(Middle line, commencing at the left.)

- FIG. 1. Earthen bowl on stand with cover. Gray ware, lightly fired.
 2. Earthen tazza. Slate-colored ware.
 3. Earthen tazza. Slate-colored ware.
 4. Earthen tazza. Slate-colored ware, unglazed.
 5. From photograph of specimen in the collection of P. L. Jouy.
 6. Earthen tazza. Slate-colored ware.

(Lower line, commencing at the left.)

- FIG. 1. Earthen tazza. Slate-colored ware, glazed a dark brown.
 2. From photograph of specimen in the collection of P. L. Jouy.
 3. Earthen tazza. Slate-colored ware, unglazed.
 4. Earthen tazza with cover. Slate-colored ware, glazed brown.
 5. Earthen tazza. Slate-colored ware with a bronze glaze.
 6. Earthen tazza. Slate-colored ware, unglazed.

PLATE LXXXV. Mortuary vessels from Korea.

(Upper line, commencing at the left.)

- FIG. 1. From photograph of specimen in the collection of P. L. Jouy.
 2. Earthen cover or lower half of a box. Dark red ware, washed with a dark brown slip.
 3. From photograph of specimen in the collection of P. L. Jouy.
 4. From photograph of specimen in the collection of P. L. Jouy.
 5. From photograph of specimen in the collection of P. L. Jouy.

(Middle line, commencing at the left.)

- FIG. 1. Earthen bottle. Slate-colored ware, unglazed.
 2. From photograph of specimen in the collection of P. L. Jouy.
 3. Earthen cup or tumbler. Gray ware, glazed dark brown inside and out.
 4. Earthen cup with handle. Terra cotta ware, unglazed.
 5. From photograph of specimen in the collection of P. L. Jouy.

(Lower line, commencing at the left.)

- FIG. 1. From photograph of specimen in the collection of P. L. Jouy.
 2. From photograph of specimen in the collection of P. L. Jouy.

PLATE LXXXV. Mortuary vessels from Korea—Continued.

FIG. 3. Earthen flower-stand. Brown ware, unglazed.

4. Earthen bowl or cup on stand, handled. Brown ware, washed outside with dark brown slip.

5. Earthen pot with handle. Brown ware, washed with a slate-colored slip.

PLATE LXXXVI. Vases and other objects in pottery shown for comparison.

(Upper line, commencing at the left.)

FIG. 1. Earthen vase on a stand. Gray earthen ware, unglazed. Nara, Japan.

2. Earthen oil-bottle. Terra cotta ware, glazed dark brown. Torai, Korea.

3. Earthen bottle. Terra cotta ware, unglazed. Nara, Japan.

(Lower line, commencing at the left.)

FIG. 1. Roman mortuary pottery.

2. Swiss lake pottery. Yverdon, L. Neuchâtel.

3. Roman mortuary pottery. Corneto.

4. Etruscan tazza.

5. Roman mortuary pottery. Ovieto.

Sketch Map of Southern Korea..... 590

A STUDY OF PREHISTORIC ANTHROPOLOGY.*

PLATE LXXXVII. Paleolithic implements. Chellian epoch.

FIG. 1. Chellian implement (flint); from St. Acheul, France.

2. Chellian implement (quartzite); from India..... 608

PLATE LXXXVIII. Paleolithic implements. Moustierian epoch.

FIG. 1. Moustierian point, spear or otherwise; from Cavern of Le Moustier.

2. Opposite side of Fig. 1.

3. Moustierian scraper, showing bulb of percussion; from Chez Pourè.

4. Opposite side of Fig. 3..... 614

PLATE LXXXIX. Paleolithic implements. Solutrian epoch.

FIG. 1. Solutrian point, shape of laurel leaf; Rigny-sur-Arroux (Saône-et-Loire), France.

2. Solutrian point; Grotte de l'Eglise, Dordogne.

3. Solutrian point; Grotte de Gargas, Vaucluse.

4. Solutrian point; Grotte de l'Eglise, Dordogne.

5, 6. Solutrian implements beautifully chipped with a shoulder on one side (flint); from Dordogne..... 614

PLATE XC. Paleolithic implements. Madelenian epoch.

FIG. 1. Grotte du Placard; Charente, France.

2. Flint graver; Gorge-d'Enfer, Dordogne, France.

3. Flint flake, worked; Les Eyzies, Dordogne, France.

4, 5. Flint points, worked to an edge; La Madeleine, Dordogne, France. 616

PLATE XCI. Paleolithic implements. Madelenian epoch.

FIG. 1. Flint scraper, with rounded end; La Madeleine, Dordogne, France.

2. Flint flake, probably a saw or knife; La Madeleine.

3, 4. Flint graters; La Madeleine, Dordogne, France..... 616

PLATE XCII. Paleolithic implements. Madelenian epoch.

FIGS. 1, 2, 3, 4. Harpoons made of reindeer horn; La Madeleine.

5, 6, 7. Points and harpoons made of reindeer horn; hole and slit for attachment to shaft. Southern France..... 616

* The greater number of the illustrations of European objects are taken from standard works on Anthropology, particularly those of Messrs. De Mortillet, Cantailhac, and John Evans.

	Page.
PLATE XCIII. Paleolithic engravings, Madelenian epoch.	
FIG. 1. Engravings of pike on canine tooth of bear; Grotte of Duruthy, southwestern France.	
2. Engraving of a man, horses, aurochs, and snake or eel on reindeer horn; La Madeleine, Dordogne, France.	
3. Engraving of seal on canine tooth of bear; Grotte of Duruthy, southwestern France.....	616
PLATE XCIV. Paleolithic engravings. Madelenian epoch.	
FIG. 1. <i>Baton de commandment</i> ; reindeer horn, on which are representations of fishes and a horse; La Madeleine, Dordogne, France.	
2. Reindeer horn; representation of a fish; La Madeleine, Dordogne, France.	
3. <i>Baton de commandment</i> ; reindeer horn, with tracing of a fish; Cave Goyet, Belgium.	
4. Rude engraving on scapula of ox; Laugerie Basse, Dordogne, France.....	616
PLATE XCV. Neolithic monuments.	
FIG. 1. Dolmen of Palo de Vinha, Portugal.	
2. Ground plan of Dolmen of Palo de Vinha, near Evora.....	624
PLATE XCVI. Neolithic monuments—tumuli and dolmens.	
FIG. 1. Tumuli in Brittany.	
2. Dolmen d'Ala Safat, Palestine.	
3. Double dolmen, near Veevajapett, southern India.	
4. Dolmen de Thizay, Indre-et-Loire, France.....	624
PLATE XCVII. Neolithic monuments—dolmens.	
FIG. 1. Dolmen of Crucuno, Morbihan, Brittany.	
2. Dolmen of Lochmariaquer, Morbihan, Brittan.....	624
PLATE XCVIII. Neolithic monuments—dolmens and tumulus.	
FIG. 1. Dolmen of Grand Island.	
2. Dolmen and tumulus of Kercado; near Plouharnel-Carnac, Morbihan.....	624
PLATE XCIX. Neolithic monuments—ground plans of dolmens in Brittany....	
624	
PLATE C. Neolithic monuments—menhirs and alignments.	
FIG. 1. Menhir of Cadiou.	
2. Menhir of Penmarek.	
3. Alignment of Menec, near Carnac.....	626
PLATE CI. Bronze implements.	
FIGS. 1, 2, 3, 4. Bronze hatchets.	
5, 6. Bronze arrow-points.	
7. Bronze fish-hook; single barb.	
8. Bronze fish-hook; double barb.....	629
PLATE CII. Palæolithic implements from the District of Columbia.....	
636	
PLATE CIII. Palæolithic implements from the District of Columbia.....	
636	
PLATE CIV. Rude chipped implements from the District of Columbia.....	
636	
PLATE CV. Rude chipped implements from the District of Columbia.....	
636	
PLATE CVI. Handled knives from Hupa, California.	
FIGS. 75, 76, 77. Hafted knives, of jasper; wooden handles attached with bitumen.	
78. Obsidian knife, wrapped around one end with a strip of otter skin.	
79. Elk horn wedge.....	640

	Page.
FIG. 1. Jaspers flint; Trenton gravels, New Jersey	631
2. Gray quartzite; Berks County, Pennsylvania	631
3. Black flint; Wyoming	632
4. Brownish-yellow jasper; Wyoming	632
5. Yellow-brown quartzite; Pamunkey, Charles County, Maryland	633
6. Indurated clay slate; Pamunkey, Charles County, Maryland	633
7. Reddish quartzite; Georgetown, District of Columbia	633
8. Pale gray flint; Austin, Texas	634
9. Yellow chert; from a shell-heap on the Tennessee River	634
10. Porphyritic felsite; Raleigh, North Carolina	634
11. Arrow-heads	637
12. Spear-heads or knives	638
13. Chipped dagger or gray flint; Alabama	639
14. Flint knife; southern Utah	639
15. Leaf-shaped implements	640
16. Leaf-shaped implements	641
17. Scrapers	643
18. Perforators	643
19. Hoes, digging tools, or agricultural implements	644
20. Polished stone hatchets	645
21. Chisels and gonges; principally from the Atlantic States. Adzes, from the Northwest coast	646
22. Grooved axes and hammer stones	647
23. Banner stones, or drilled ceremonial weapons	648
24. Pierced tablets and boat-shaped articles	650
25. Stone beads, pendants, and other ornaments	651
26. Plummets and sinkers	653
27. Discoidal stones	654
28. Perforated stones; club-heads, or riatta	655
29. Cutting tools, scraper, and spade like implements	657
30. Stone vessels	658
31. Stone plates or platters	658
32. Mortars	659
33. Pestles and hammers	660
34. Cup stone	661
35. Stone pipes; from Ohio mounds	662
36. Stone pipes; from various localities	663
37. Tubes	664
38. Calumet pipe; from the Kentucky University	665
39. Bone implements	666
40. Copper implements and ornaments; from the United States	667
41. Human representations	668
42. Shell implements and ornaments	669
43. Pottery	671

ANCIENT INDIAN MATTING.

PLATE CVII. Ancient Indian matting, Petit Anse Island, Louisiana	674
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SECTION I.

REPORT

UPON THE

CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM
DURING THE YEAR ENDING JUNE 30, 1888.

BY

G. BROWN GOODE,

ASSISTANT SECRETARY SMITHSONIAN INSTITUTION, IN CHARGE OF
U. S. NATIONAL MUSEUM.

REPORT

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Assistant Secretary, Smithsonian Institution, in charge of the National Museum.

A.—GENERAL CONSIDERATIONS.

In January, 1847, the first Board of Regents after many weeks of consultation and deliberation over the plans for the organization of the Smithsonian Institution unanimously voted the following resolution:

*Resolved, That it is the intention of the act of Congress, and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust, is the accumulation of collections of specimens and objects of natural history and of elegant art, and the gradual formation of a library of valuable works pertaining to all departments of human knowledge, to the end that a copious store-house of materials of science, literature, and art may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge.**

This was a high ideal for the future National Museum, but it is one which it has been year after year more closely approaching, and it is hoped that the present report will show that the work accomplished during the fiscal year of 1887-'88 has brought us still nearer to its realization.

With the death of Professor Baird, August 19, 1887, the National Museum passed from under the direction of the mind by which its policy had been planned for many years. If his biography could be properly written, it would include a full history of the Museum, as well as of the Fish Commission, and in minor degree of the Smithsonian Institution itself, for as secretary and assistant secretary he was associated with nearly every phase of its activity during thirty-seven of its forty-one years of corporate existence. With the Fish Commission, first of all, his name is identified as its founder as well as its chief adminis-

* Report of Committee on Organization, p. 20

trator, and with the National Museum almost as closely, though less exclusively, since, though not its originator nor its sole director, his was, as has been said, for a very long time the master mind in its management. His relation to it was very similar to that held by Sir Henry Cole to the great national establishment at South Kensington in England, so well described in the volumes entitled "Fifty Years of Public Work," and recently published by his son, Mr. Alan Cole.

With the death of Professor Baird the Museum must of necessity enter upon a new period in its history, for his successors, be they never so desirous of perpetuating his policy, can not apply to its management the same kind of supervision, nor the result of such a life-time of experience and observation.

Upon the firm foundation which he has laid they must build a superstructure, harmonious in plan, but, it may be, different in proportions and even in material. Their safest course must be not to work as he did, under circumstances different from those which are henceforth to exist, but to try to work as he would have done in connection with these changed circumstances.

EARLY HISTORY OF THE MUSEUM.

The idea of a national museum in the city of Washington was first suggested by the Hon. Joel Roberts Poinsett, of South Carolina, Secretary of War under President Van Buren, who in 1840 organized, for the purpose of establishing such a museum, a society called "The National Institution," afterwards "The National Institute," which was exceedingly prosperous and active for four years. By this Society the nucleus for a national museum was gathered in the Patent Office building in Washington, and public opinion was educated to consider the establishment of such an institution worthy of the attention of the Government of the United States. In 1846, having failed in securing the public recognition at which it aimed, and the Smithsonian Institution being by its charter entitled to take possession of the extensive Government collections already assembled in its charge, the society became torpid, and eventually, in 1861, passed out of existence.

From 1844 to 1858, when the so-called "National Cabinet of Curiosities" passed into the charge of the Smithsonian Institution, the term "National Museum" was in disuse. From that time onward, however, it was used, unofficially, to designate the collections in the Smithsonian building.

After the "National Cabinet" was delivered to the Regents, appropriations were made by Congress for its maintenance. During the twenty-three years which followed, the collections were greatly increased and were made the subjects of numerous important memoirs upon the natural history and ethnology of America. The public halls, with their arrangements for the exhibition of a portion of the collections, also received a due share of attention, and a certain amount of instruction and

pleasure was afforded to visitors. The appropriations, however, were meagre, the space limited, and the staff was so inadequate that little could be done except to keep the collections in good preservation.

The Exhibition of 1876 in Philadelphia was an event of great educational importance to the people of the United States; and not the least of its benefits were the lessons it taught as to the possibilities for good in public museums. The objects which at the close of the Centennial were given to the United States for its National Museum were of much intrinsic value, but were still more important in that they led to the erection of a large building for the expansion of the Museum itself.

From 1876 to 1881 was a period of quiet preparation for future effort. From 1881 to 1888, another period of seven years, its growth has been rapid, though the organism is still in its infancy. These seven years have been years of experiment, but it is hoped that it is now evident to the people and to Congress that the young museum is now ready to begin a promising progress toward maturity.

PROGRESS IN THE WORK OF THE MUSEUM.

Among the more important features of the work, up to the present time, certain definite steps of progress have been taken, among the most important of which may be mentioned:

(1) An organization of the Museum staff has been effected—efficient for present purposes and capable of expansion and extension as occasion may require.

(2) Through the agency of this staff, the materials in the Museum, the accumulations of nearly half a century, have been examined, classified, and brought under control.

(3) The collections have been almost quadrupled in extent.

(4) A beginning has been made toward the development of a thoroughly labeled exhibition series, available for the instruction of the public.

(5) A thorough study of the organizations and systems of classification in other museums throughout the world has been made, the results of which are beginning to appear in the work of the Museum staff. A report upon the great museums of the world is in preparation and will soon be published.

(6) Many new methods of installation have been developed by experiments in the Museum, and in the expositions in which the Museum has participated. These are finding favor, and are being adopted in many similar establishments at home and abroad, and will certainly add to the economy and success of our own administration.

(7) Science has been forwarded by the publication of many hundreds of papers describing the materials in the Museum, while the work of specialists in the production of these papers has greatly improved the significance and value of the collections.

NECESSITY FOR A NATIONAL MUSEUM.

That the United States must have a National Museum is so evident that the proposition needs no argument for its support.

Every considerable nation has a museum or group of museums in its capital city—centres of scientific and educational activity—the treasure-houses of the nation, filled with memorials of national triumphs in the fields of science, art, and industrial progress.

They are legitimate objects of national pride, for upon the character of its museum and libraries intelligent persons visiting a country very properly base their judgment as to the nature and degree of the civilization of the people.

In most great cities, as I have said, there is a group of museums. London, for instance, has—

- The British Museum, with its collection of books and manuscripts, its galleries of archaeology, historic and prehistoric, its collection of coins, pottery, sculpture, etc.

The Natural History Museum (devoted to botany, mineralogy, and geology).

The South Kensington Museum (arts and art-manufactures).

The Bethnal Green Museum (industrial and decorative art).

The National Gallery of Art.

The National Portrait Gallery.

The Museum of Practical Geology.

The Museum of Economic Botany at Kew.

The Imperial Institute (commerce and natural resources of the British Empire).

The Parkes Museum of Hygiene.

The India Museum.

The Patent Museum.

The Hunterian Museum (comparative anatomy).

The Museum of Naval Architecture.

The National Museum of Fisheries, and others.

Paris has—

The Museum of the Louvre (art and archaeology).

The Luxembourg Museum (modern art).

The Museum of Natural History and Comparative Anatomy in the Garden of Plants.

The Geological Museum.

The Ethnological Museum at the Trocadero.

The Museum of Arts and Manufactures.

The Museum of the City of Paris.

The St. Germain Museum (French archaeology).

The Cluny Museum (costumes, furniture, and decoration (?)).

The Military Museum at the Hotel des Invalides.

The Guimet Museum (history of religion).

The Museum of Marine Architecture in the Louvre.

The Collections at the Gobelins and Sevres establishments, and others.

Berlin, St. Petersburg, and Vienna have similar groups, and so have Florence, Christiania, Stockholm, Copenhagen, Leyden, Brussels, Madrid, Buda-Besth, Tokio, and other national establishments.

It should be borne in mind that here in Washington under the roofs of the Smithsonian and New Museum buildings are grouped together collections which in London, Paris, or any other of the European capitals are provided for in a group of museums, for accommodating

which a much larger number of equally commodious buildings is found needful.

POSSIBILITIES OF THE FUTURE.

It is possible, as I remarked in last year's report, to show that Washington may readily be made the seat of one of the greatest museums in the world. It will perhaps be neither practicable nor desirable to gather together in Washington collections of ancient mediæval art, such as those which adorn the capitals of Europe; but a representative series of such objects will undoubtedly grow up, which shall tend to educate the public taste, and to promote, so far as possible, the study of the elements of art and the history of civilization, as well as to forward the growth of the arts of design. This having been accomplished, the attention of the Museum should be directed mainly toward the exhibition of the geology and natural history of America, and its natural resources, to the preservation of memorials of its aboriginal inhabitants, and the exposition of the arts and industries of America.

It is evident that the National Museum of the United States will of necessity have features peculiar to itself, developed in response to the peculiar needs of the people of this continent. It should be remembered that the national collections of every principal European nation are divided into several groups, each under separate administration, though often within the general control of some central authority. In France, for instance, most of the museums are under the Ministry of Public Instruction, and in England, to a less extent, under the Department of Science and Art.

In the great European capitals the public collections are scattered through various parts of the cities, in museums with distinctive names and independent in their organizations. Much of the work which should properly be done by such museums is omitted, because no one of them has seen fit to undertake it; while, on the other hand, much labor is duplicated, which is perhaps equally unfortunate, collections of similar scope and purpose being maintained in different parts of the same city. One of the chief objections to such division of effort is that much of the value of large collections in any department is lost by failure to concentrate them where they may be studied and compared side by side. In Washington the national collections are all, without exception, concentrated in one group of buildings. The Army Medical Museum now occupies a building side by side with those under the control of the Smithsonian Institution, and this proximity, in connection with the long-established policy of co-operation between the two organizations, will cause them to be, for all practical purposes, united in interest.

POSSIBILITIES OF INCREASE AND IMPROVEMENT.

Although the appropriations from the public treasury for the maintenance of a national museum are small, compared with those in several European countries, the value of objects given by private individ-

uals is proportionately larger. The actual value of such contributions for ten years past, has not, it is estimated, fallen short of \$20,000 a year, and in some years has been greater.

Among important gifts may be mentioned such as the George Catlin Indian Gallery, of inestimable value to the American historian and ethnologist; the Riley collection of North American insects, the finest in existence, containing 150,000 specimens, and easily worth \$50,000; the collection bequeathed in 1887 by the late Isaac Lea, of Philadelphia, containing besides minerals and other objects, about 20,000 conchological specimens, and appraised by the State at \$10,000; and the collection of the American Institute of Mining Engineers, for the transfer of which from Philadelphia to Washington, a special appropriation was made by Congress.

Some exceedingly valuable collections in this country and in Europe have been bequeathed to the Smithsonian Institution which have not yet come into its possession. Within the past ten years it is estimated that individuals to the number of at least a thousand have made gifts to the Museum to the value of \$100 or more.

Of the fourteen hundred and eighty-two separate lots of specimens received within the past fiscal year at least one thousand were gifts, from nearly as many individuals—some of little value, others very important.

Not a day passes during which some stranger, pleased with the work of the Museum, does not voluntarily send in some contribution more or less important.

The National Museum now contains about 2,900,000 objects, distributed among the various departments, as is shown in the table on page 22, of this report.

The late Professor Baird was once asked whether the value of the collections in the National Museum was equal to the amount which had been expended in its maintenance. He replied, unhesitatingly, that although it would be by no means a fair criterion of their value he did not doubt that by a judicious and careful system of sale the entire sum could be recovered.

One of the most striking features in the affairs of the Museum is the manner in which its collections are increasing.

In 1887 the number of specimens was more than ten times as great as five years before.

In the last fiscal year twenty-five thousand new lots or groups of specimens were entered upon the Museum catalogue.

This increase, as has been shown, is in large degree spontaneous, only a small amount of money being available for the purchase of new material.

As might be supposed, a considerable proportion of the objects given duplicate material already on hand, and although these contributions can with the utmost advantage be used for distribution to other museums and schools, they do not increase as much as is desired the

value of the collections for study by specialists, and for general educational purposes. The need of a larger fund for the purchase of specimens is yearly more manifest. Exceedingly important material is constantly offered to us at prices very much below what it would cost to obtain it by collecting, and in many instances, when refused, it is eagerly taken by the museums and institutions of Europe.

The most enlightened nations of Europe do not hesitate to spend money liberally to promote the interests of their national museums.

For the purchase of specimens for the South Kensington Museum from 1853 to 1887 \$1,586,634 was expended; or a yearly average of nearly \$47,000.

Toward her other museums England is equally liberal. Exact statistics are not at hand, but it is quite within bounds to assert that her average expenditures for the purchase of new objects for museums in London is not less than \$500,000 a year.

The museums of England are rich with the accumulations of centuries. The National Museum of the United States is young and has enormous deficiencies in every department. It needs, more than any museum in Europe, the opportunity to increase its resources through purchase. The total amount expended for the purchase of specimens for the National Museum since its foundation has not exceeded \$20,000, and never in one year more than \$8,500.

More has been expended for the improvement of two museums in the city of New York in the past four years than has ever been expended by the general Government upon the Museum in Washington.

Within the past year three mortifying instances have occurred of the inability of the National Museum to buy specimens needed to complete its collections.

A very valuable collection of minerals, absolutely essential to the national collections and for some years on deposit in the National Museum, was withdrawn by its owner and placed in a school museum in a neighboring city, because \$4,000 could not be had for its purchase—a sum far below its value.

A collection of implements and weapons illustrating the history of the natives of Alaska, gathered by an officer in the U. S. Navy, and almost indispensable for the completion of the national ethnological collection, was sold to a museum in a neighboring city for \$12,000, while the National Museum had no money to expend for such objects.

One of the most important collections of birds in America, the loss of which was a national misfortune, was taken from the city of Washington and sold to the British Museum for \$10,000, no American institution having money available for its purchase.

Instances of this kind occur nearly every month in every year.

The National Museum has had the option for several years of the purchase at cost of \$80,000 of a collection of minerals, which once acquired would enable its mineralogical department to rank among the first in the world. Congress has never been asked to make an appro-

priation for its purchase, simply because of unwillingness to ask for that which might not be granted. Minerals, having a money value, can readily be sold, and are not very often given to the Museum, and the poverty of its mineralogical collection is by no means creditable to the nation.

The Museum receives many valuable gifts from Government officials abroad, especially from those in the consular and diplomatic service, and in the Navy.

If the actual cost of gathering specimens could be paid, the time and experience of these men would gladly be given gratuitously. In this way, by the expenditure of a few thousands each year, extensive and important additions might be made to the national collections.

THE NECESSITY FOR A NEW MUSEUM BUILDING.

The National Museum is now approaching an important crisis in its history. Its future will depend upon the action of Congress in granting it an additional building, for without more room its growth can not but be in large degree arrested.

The necessity for additional room is constantly increasing, and several of the collections, to wit, transportation and engineering, fishes, reptiles, birds' eggs, mollusks, insects, marine invertebrates, vertebrate and invertebrate fossils, fossil and recent plants, are in some instances wholly unprovided for, and in others only in a very inadequate degree.

In the main hall of the Smithsonian building is still exhibited the collection of birds. A few cases containing birds' eggs and shells have recently been arranged along the center of this hall.

There are at the present time nineteen departments in the National Museum, eleven of which have no space assigned to them in the Museum building, solely on account of its crowded condition. The collection of prehistoric anthropological objects remains installed on the second floor of the Smithsonian building. The collections of the remaining ten departments can not be exhibited or even properly arranged and classified without more room. These collections are at present stored in the attics and basements of the Smithsonian and Armory buildings, and are inaccessible for study and for the other purposes for which they were obtained. The specimens comprising these collections are not simply objects of natural history, possessing an abstract interest to the student, but represent the application of natural objects to the industries, and, as such, are of great importance. There are several collections of ores, minerals, building stones, and of objects representing various arts and industries, which are of very great value, since they furnish to the American manufacturer and designer information of inestimable importance.

The increase in the national collections during the last six years may perhaps be best described by the statement that in 1882 the total number of specimens recorded in the Museum was about 183,000; while in 1887 the records indicated the possession of more than 2,900,000

specimens. It is proper to say in this connection that the actual increase was not so great as shown by the records, since during this period a large amount of material previously received had been brought under control and placed on the books of the Museum. It should also be borne in mind that the present Museum building was planned with reference to the reception of the material in its custody at the time of its construction.

In the Armory building there are at the present time several hundreds of boxes containing valuable material which has never been unpacked, since there is no space available for the display of the specimens. Many of the boxes contain collections which were brought to the Museum through the medium of special acts of Congress.

Independently of the collections obtained at expositions, a very large amount of material has been received from foreign Governments, among which may be mentioned those of Mexico, Central America, several of the South American States, and Japan, which have made extensive contributions to the zoölogical, geological, ethnological, and technological collections.

APPRECIATION BY FOREIGN NATIONS.

The new methods of work and of museum arrangement, which have grown up here, have attracted much attention abroad. Mexico, in 1887, sent the entire collections of the National Natural History Museums, then just being founded, to Washington, in charge of two of her principal naturalists, who passed six months at the National Museum identifying their material and studying the methods of administration. Costa Rica, forming a national museum, sent its director here for a six months' course of study.

Japan has sent the entire national collection of birds to the Museum to be studied and reported upon by one of the naturalists of the Museum staff.

Germany has been supplied with a complete set of plans and illustrations of methods of administration at the request of the Director of the National Zoölogical Museum.

In 1883, at the Fisheries Exhibition in London, the methods of the National Museum were strictly adhered to in the arrangement of the display made by the United States.

In 1888, in his address as president of the Anthropological Society of the British Association for the Advancement of Science, General Pitt-Rivers said that the American display at the Fishery Exhibition was the only thing done in the true spirit of modern science in the whole series of professedly scientific exhibitions held in London within the past six years.*

* The words of General Pitt-Rivers in 1888 are simply a repetition of what he said in 1883, made stronger by the observations of five more years of exhibitions in Europe.

In 1883 he wrote to the London Times:

SIR: In confirmation of the praise you justly bestow on the arrangement of the United States department in the Fisheries Exhibition I beg to draw attention to the

Such expressions of opinion, coupled with the constant praise with which European journals speak of the scientific work of our Government departments, can not but be gratifying, and it should be a matter of national pride to merit it.

THE RELATIONS OF THE MUSEUM TO THE SMITHSONIAN INSTITUTION.

The Smithsonian Institution, though it bears the name of a private citizen and a foreigner, has been for nearly half a century one of the principal rallying points of the scientific workers of America. It has also been intimately connected with very many of the most important scientific undertakings of the Government.

Many wise and enlightened scholars have given to its service the best years of their lives, and some of the most eminent scientific men our country has given birth to have passed their entire lifetime in work for its success. Its publications, six hundred and seventy in number, which when combined make up over one hundred dignified volumes, are to be found in every important library in the world, and some of them, it is safe to say, on the working table of every scientific investigator in the world who can read English.

Through these books, through the reputation of the men who have worked for it and through it, and through the good accomplished by its system of international exchange, by means of which within the past thirty-eight years 1,262,114 packages of books and other scientific and literary materials have been distributed to every region of the earth, it has acquired a reputation at least as far reaching as that of any other institution of learning in the world.

It is therefore representative of what is deemed in other lands the chief glory of this nation, for whatever may be thought in other countries of American art, of American literature, American institutions generally, the science of America is accepted without question as equal to the best.

In the scientific journals of Great Britain and other European countries, the reader finds most appreciative reviews of the scientific publications of the Smithsonian, the Museum, the Bureau of Ethnology, the Geological Survey, the Department of Agriculture, and the Fish Commission, and they are constantly holding up the Government of the United States, as an example to their own, of what governments should do for the support of their scientific institutions.

fact that in the whole exhibition it is the only one which is arranged historically. In the Chinese, Japanese, Scandinavian, and Dutch courts there are objects which the scientific student of the arts of life may pick out and arrange in the proper order in his own mind; but in that of the United States, following the method adopted in the National Museum in Washington, there has been attempted something more—to bring the department into harmony with modern ideas. This gives to the exhibition an interest which is apart from commerce, and an interest which is beyond the mere requirements of fish culture, and it may be regarded as one out of many indications of the way in which the enlightened Government of the United States mark their appreciation of the demands of science.

I have the honor to be, sir, yours obediently,

A. PITT-RIVERS.

It is surely a legitimate source of pride to Americans that their work in science should be so thoroughly appreciated by eastern nations, and it is important that the reputation should be maintained. Nothing can be more in consonance with the spirit of our Government, nor more in accord with the injunction of Washington in his "Farewell Address," lately admiringly quoted by Sir Lyon Playfair in his address as president of the British Association for the Advancement of Science:

Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge.

In proportion as the structure of a government gives force to public opinion it should be enlightened.

No one has been able to show why Smithson selected the United States as the seat of his foundation. He had no acquaintances in America, nor does he appear to have had any books relating to America except two. Rhees quotes from one of these ["Travels through North America," by Isaac Weld, secretary of the Royal Society], a paragraph concerning Washington, then a small town of 5,000 inhabitants, in which it is predicted that "the Federal city, as soon as navigation is perfected, will increase most rapidly, and that at a future day, if the affairs of the United States go on as rapidly as they have done, it will become the grand emporium of the West, and rival in magnitude and splendor the cities of the whole world."

Inspired by a belief in the future greatness of the new nation, realizing that while the needs of England were well met by existing organizations such as would not be likely to spring up for many years in a new, poor, and growing country, he founded in the new England an institution of learning, the civilizing power of which has been of incalculable value. Who can attempt to say what the condition of the United States would have been to-day without this bequest?

In the words of John Quincy Adams:

Of all the foundations of establishments for pious or charitable uses which ever signalized the spirit of the age or the comprehensive beneficence of the founder, none can be named more deserving the approbation of mankind.

The most important service by far which the Smithsonian Institution has rendered to the nation, has been that from year to year, since 1846—intangible but none the less appreciable—by its constant co-operation with the Government, public institutions and individuals in every enterprise, scientific or educational, which needed its advice, support or aid from its resources.

There have been, however, material results of its activities, the extent of which can not fail to impress any one who will look at them; the most important of these are the *Library* and the *Museum*, which have grown up under its fostering care.

The library has been accumulated without aid from the treasury of the United States; it has, in fact, been the result of an extensive system of exchanges, the publications of the Institution having been used to

obtain similar publications from institutions of learning in all parts of the world.

In return for its own publications the Institution has received the books which form its library.

This library, consisting of more than a quarter of a million volumes and parts of volumes, has for over twenty years been deposited at the Capitol as a portion of the Congressional Library, and is constantly being increased. In the last fiscal year nineteen thousand titles were thus added to the national collection of books.

Chiefly through its exchange system, the Smithsonian had, in 1865, accumulated about forty thousand volumes, largely publications of learned societies, containing the record of the actual progress of the world in all that pertains to the mental and physical development of the human family, and affording the means of tracing the history of at least every branch of positive science since the days of revival of letters until the present time.

These books, in many instances presents from old European libraries, and not to be obtained by purchase, formed even then one of the best collections of the kind in the world.

The danger incurred from the fire of that year, and the fact that the greater portion of these volumes, being unbound and crowded into insufficient space, could not be readily consulted, while the expense to be incurred for their binding, enlarged room, and other purposes connected with their use threatened to grow beyond the means of the Institution, appear to have been the moving causes which determined the Regents to accept an arrangement by which Congress was to place the Smithsonian Library with its own in the Capitol, subject to the right of the Regents to withdraw the books on paying the charges of binding, etc. Owing to the same causes (which have affected the Library of Congress itself) these principal conditions, except as regards their custody in a fire-proof building, have never been fulfilled.

The books are still deposited chiefly in the Capitol, but though they have now increased from 40,000 to fully 250,000 volumes and parts of volumes, and form one of the most valuable collection of the kind in existence, they not only remain unbound, but in a far more crowded and inaccessible condition than they were before the transfer. It is hardly necessary to add that these facts are deplored by no one more than by the present efficient Librarian of Congress.

The purchasing power of the publications of the institution, when offered in exchange, is far greater than that of money, and its benefit is exerted chiefly in behalf of the National Library, and also to a considerable extent in behalf of the National Museum.

The amount expended during the past forty years from the private fund of the institution in the publication of books for gratuitous distribution has been \$350,000, a sum nearly half as great as the original Smithsonian bequest.

These publications have had their influence for good in many ways, but in addition to this, a library much more than equal in value to the outlay, has through their buying power come into the possession of the nation.

In addition to all this, a large amount of material has been acquired for the Museum by direct expenditure from the private fund of the Smithsonian Institution. The value of the collections thus acquired is estimated to be more than equal to the whole amount of the Smithsonian bequest.

The early history of the Museum was much like that of the library. It was not until 1858 that it became the authorized depository of the scientific collections of the Government, and it was not until after 1876 that it was officially recognized as the National Museum of the United States.

But for the provident forethought of the Smithsonian Institution, the United States would probably still be without even a reputable nucleus for a National Museum.

The relations of the Museum to the system of popular lectures, for many years established in Washington, and the assistance which it affords each year to students of science, is referred to elsewhere in this report.

The Institution publishes many circulars giving information on scientific subjects which are distributed gratuitously to those who write to make inquiries, and this system is being continually extended. In addition to this, a large correspondence is carried on with people in search of information on scientific topics. Probably three thousand letters a year go out to people who write seeking to know the name of some object, or other scientific fact.* Inquiries of this kind are always answered promptly and fully, and frequently, to intelligent inquirers, books are sent, which will enable them to find out such names for themselves in future. This work has not only an educational value but often a great economic importance as well; as, for instance, when some common mineral has been mistaken for one of value, some useless plant has been wrongly identified and supposed to be of service in medicine, or some harmless animal feared as noxious.

The publications of the Institution and its dependencies reach every State and almost every county in the United States. A careful study of the subject recently made by the president of one of the scientific societies in Washington seems to indicate that there are several States which are reached by no scientific publications whatever except those distributed gratuitously by the Government.

Speaking of the Smithsonian Institution proper, and not of the Museum or any other trust that it administers, it may be stated that nothing could be so desirable for the Institution as that Congress should examine for itself whether, on the whole, in the execution of the trust of Smithsonian, more has been given to the Government than has been re-

* See statement on page 58.

ceived; for if, in attempting to increase and diffuse knowledge among mankind, the machinery of the Institution's action has been such that it has incidentally paid over to the Government the equivalent of much more than the whole original fund, these facts should surely be known to those who have to ask themselves in what spirit as well as for what purpose the Institution expends money placed in its charge.

Professor Langley has pointed out that "although by the judicious administration of the Smithsonian fund nearly a million and a half dollars—the fruits of its investment—have been applied during the past forty years to the advancement of science and education in America (in addition to the principal \$703,000, larger now than ever before) it should be remembered that the income of the Institution is only \$42,000 a year, a sum much smaller in its power to effect results than ever in previous years."

Can the United States fail to recognize its obligation to supplement liberally this private contribution for public good, especially if it be born in mind that, as Professor Langley has recently shown, the Institution has left in perpetual charge of the nation, in the Museum alone, property acquired out of its private fund (and to which it has apparently the same title) which is probably now more than equal in value to the whole amount of the Smithsonian bequest.

THE EDUCATIONAL WORK OF THE MUSEUM.

The work of the Museum, if it only performed the functions of an institution for scientific investigation, would be of sufficient value to justify its maintenance and extension.

As a matter of fact, it not only performs these functions but also does a very great deal to render the resources of science available to the public at large.

Professor Huxley's definition of a museum was that it is "a consultative library of objects."

The National Museum is a consultative library for the scientific man, and it is something more. It aims to be an agency for the instruction of the people of the whole country, and to keep especially in mind the needs of those whose time is not devoted to the study of science.

The spirit in which the work of the Museum is being carried on was voiced in the address of one of its officers before the American Historical Association at its recent meeting in this city, in which it was said:

(1) *That public institutions of this kind are not intended for the few, but for the enlightenment and education of the masses.*

(2) *That the public has a right to full participation in the results of the work of the scientific establishments which they are helping to maintain.*

(3) *That one of the chief duties of the officers of these institutions is to provide means by which such results may be presented in an attractive as well as an intelligible form.*

No scientific institution is more thoroughly committed to the work of the diffusion of knowledge than is the Smithsonian Institution, and no

department of its activity is more capable of usefulness in this direction than is the National Museum.

The benefits of the Museum are extended not only to the specialists in its laboratories and to the hundreds of thousands of visitors, from all parts of the United States who pass its doors each year, but to local institutions and their visitors throughout the country.

In accordance with long-sanctioned usage, the duplicate specimens in the Museum are made up into sets and distributed to schools and museums, accurately named, and of great service, both for museum and class-room use.

The reports of the Smithsonian Institution will show how many hundred thousands of objects have been thus distributed during the past twenty years. Every museum in the United States has profited in this way, and by its system of exchange the Museum has, while enriching itself, contributed largely to the stores of every important scientific museum in the world.

Not only are specimens thus sent out, but aid is rendered in other ways. Within the last year not less than forty local museums in the United States were supplied with working plans of cases in use in the Museum, and similar sets of plans have been supplied within the past few years to national museums in other countries.

Not only do the people of the country at large profit by the work of the Smithsonian, as made available to local institutions, but they profit directly, and personally to a very considerable extent.

The curator of each department in the Museum is expected to be an authority in his own line of work, and the knowledge of the whole staff of experts is thus placed without cost at the service of every citizen.

B.—ORGANIZATION AND SCOPE OF THE MUSEUM.

The National Museum is under the direction of the Smithsonian Institution, which is governed by an establishment consisting of the President of the United States and his Cabinet, the Commissioner of Patents, and the Board of Regents, which latter is composed of the Vice-President, Chief-Justice of the United States, three members of the Senate, three members of the House of Representatives, and six other citizens not members of Congress, two of whom are residents of the city of Washington.

The Secretary of the Smithsonian Institution, to whom is intrusted the actual management of its affairs, is by law the "keeper of the collections." The staff at the present time is composed of the Assistant Secretary of the Smithsonian Institution in charge of the National Museum, and twenty-seven curators and acting curators, seventeen of whom receive no salary from the Museum appropriation. There are also twelve administrative departments.

The collections of the Museum are made up, in large part, of the following materials:

1. The natural history and anthropological collections, accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. The collections of the Wilkes exploring expedition, the Perry expedition to Japan, and other naval expeditions.

3. The collections of the scientific officers of the Pacific Railroad survey, the Mexican boundary survey, and of the surveys carried on by the Engineer Corps of the Army.

4. The collections of the U. S. geological surveys under the direction of the U. S. geologists, Hayden, King, and Powell.

5. The collections of the U. S. Fish Commission.

6. The gifts by foreign Governments to the Museum or to the President or other public officers of the United States, who are forbidden by law to retain such gifts in their private possessions.

7. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States at the International Fisheries Exhibition at Berlin in 1880 and at London in 1883.

8. The collections given by the Governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia in 1876.

9. The industrial collections given by numerous manufacturing and commercial houses of Europe and America, at the time of the Philadelphia Exhibition and subsequently.

10. The material received, in exchange for duplicate specimens, from the museums in Europe and America, at the time of the Philadelphia Exhibition and subsequently.

In connection with the general work of administration there is in the Museum a library, a chemical laboratory, a photographic establishment, and various workshops for taxidermy, modeling, and for the preparation of skeletons for exhibition. In connection with the department of art and industry two preparators are constantly employed.

The publications of the Museum consist of (1) The Annual Report; (2) The Proceedings of the United States National Museum; (3) The Bulletin of the United States National Museum; (4) The series of circulars. These have, in part, been reprinted in the volumes of the Smithsonian Miscellaneous Collections.

C.—SPECIAL TOPICS OF THE YEAR.

THE CINCINNATI EXHIBITION.

By act of Congress, approved May 28, 1888,* the Smithsonian Institution was directed to participate in the Centennial Exposition of the Ohio Valley and Central States, and the latter months of the fiscal year have been devoted by the curators to the preparation of special exhibits. The fourth of July has been announced as the date of opening the exhibition. Very little time, therefore, remains for the completion of this work.

THE PROPOSED STATUE TO PROFESSOR BAIRD.

On December 12, 1887, a bill† was introduced into the Senate by Senator Morrill, appropriating \$15,000 for the erection of a bronze statue of Professor Baird, the late Secretary of the Smithsonian Institution. This bill passed the Senate on February 9, but failed to come up for action in the House of Representatives.

THE CAPRON COLLECTION.

For a number of years the collection of lacquers, bronzes, carved ivories, coins, and other works of art, obtained in Japan by the late General Horace Capron, has been deposited in the National Museum. It is the property of his heirs, who are desirous of selling it to the Government. On December 21, 1887, a bill‡ providing for its purchase was introduced into the Senate by Hon. Daniel Voorhees, of Indiana. This bill was favorably acted upon in the Senate, but did not come to a vote in the House of Representatives.

INCREASING GROWTH OF THE COLLECTIONS.

During the last three years (since the adoption of the standard of the fiscal year by the Smithsonian Institution) the number of accession "lots" received has been 4,623, including nearly five hundred and twenty thousand specimens. The last accession number in June, 1888, was 20831.

REARRANGEMENT OF THE EXHIBITION HALLS.

The appearance of the exhibition halls has been, it is thought, very much improved during the year. Some new methods of installation have been successfully inaugurated in some of the departments. Several new forms of cases have also been adopted. The co-operation of the

* Fiftieth Congress, first session. House resolution No. 127, "to establish a centennial exposition of the Ohio Valley and Central States." Introduced by Hon. Benjamin Butterworth, of Ohio, on March 5, 1888; passed the Senate and House of Representatives May 17, and became a public law on May 28, 1888. The sum of \$50,000 was appropriated in this bill, to enable the Smithsonian Institution, U. S. National Museum, and the U. S. Fish Commission to prepare and send exhibits.

† Senate bill 140.

‡ Senate bill No. 1033.

Johns Hopkins University has been secured in the formation of a collection of Oriental Antiquities. Other new sections have been organized.

TRANSFER OF DISBURSEMENTS FROM THE DEPARTMENT OF THE INTERIOR.

The rapid growth of the Museum for several years past has shown it to be desirable that the direct administration of the Museum appropriations should be transferred from the Department of the Interior to the hands of the Smithsonian Institution, the legal custodian of the Museum and its collections. This matter was fully discussed at the last annual meeting of the Board of Regents, and a conference between the Chancellor of the Smithsonian Institution, the Secretary of the Interior, and the Secretary of the Smithsonian Institution was held on February 13. Some correspondence followed between the Secretary of the Interior and the Secretary of the Smithsonian Institution, in which the former consented to the proposed transfer. This correspondence is published in the report of the Secretary of the Smithsonian Institution to the Board of Regents for this year.*

A letter was then addressed to the chairman of the House Committee on Appropriations,* setting forth the facts in the case, and the changes proposed. These were indicated in the sundry civil bill, and, if approved by Congress, the disbursement of money appropriated for the National Museum will hereafter be made by an officer designated by the Secretary of the Smithsonian Institution.

THE COLLECTION OF LIVING ANIMALS.

Early in the year preparations were made for the establishment of a department of living animals in the Museum, in order to afford to the taxidermists an opportunity of observing the habits and positions of the various species, with a view to using the knowledge thus acquired in the mounting of skins for the exhibition series of mammals. Active work in this department commenced in October. Mr. William T. Hornaday was appointed curator.

The U. S. Fish Commission kindly tendered the use of one of its special cars then about to be sent to the far west, for the transportation of living animals to Washington, and Mr. Hornaday visited several of the northwestern States and Territories. The expedition was very successful, and a large number of deer, bears, foxes, lynxes, eagles, and other animals were obtained as a nucleus for the collection.

D.—THE CONDITION OF THE COLLECTIONS.

INCREASE OF THE COLLECTIONS.

Since the erection of the present Museum building in 1881 there have been more than 12,000 accessions to the collections, chiefly by gift. From 1859 to 1880 the accessions numbered 8,475. It is thus evident

* Pages 8-11.

* Page 8, *ibid.*

that during the last eight years the number of accessions has been half as large again as during the previous twenty-one years. Many of the more recent ones are of very great extent. Among these may be mentioned the bequest of the late Isaac Lea, of Philadelphia, which contains 20,000 specimens of shells, besides minerals and other objects; the Jeffreys collection of fossil and recent shells of Europe, including 40,000 specimens; the Stearns collection of mollusks, numbering 100,000 specimens; the Riley collection of insects containing 150,000 specimens; the Catlin collection of Indian paintings, about 500 in number; the collection of the American Institute of Mining Engineers, for the transportation of which to Washington several freight-cars were required.

There are also the extensive collections obtained at the Fisheries Exhibitions at Berlin and London and at the close of the New Orleans Cotton Centennial; the Shepard collection of meteorites; the Wilson collection of archaeological objects (more than 12,000 specimens); the Lorillard collection of Central American antiquities, and very many others nearly as extensive. In addition to these are the annual accretions from the work of the U. S. Fish Commission, the U. S. Geological Survey, and the Bureau of Ethnology, as well as the contributions from several expeditions of the Government, from Army and Navy officers, and from other Government officials. These have been very extensive, and are yearly increasing in bulk and value.

The accessions during the year are 1,481 in number (19351-20831). These consist, in the aggregate, of more than 137,000 specimens. A table showing approximately the number of specimens in the Museum in 1882 and received each year since is given in the next paragraph, devoted to the census of the collections.

CENSUS OF THE COLLECTIONS.

One of the most striking features in connection with the affairs of the Museum is the remarkable increase in the extent of its collections. This increase is in a large degree spontaneous, only a very small sum of money being available for the purchase of new material. As might be supposed, a considerable proportion of the objects given duplicate material already on hand, and although these contributions can with the utmost advantage be used for distribution to other museums and schools, they do not increase, as much as is desired, the value of the collections for study by specialists and for general educational purposes. The need of a larger fund for the purchase of specimens is yearly more manifest. Exceedingly important material is constantly offered to us at prices very much below what it would cost to obtain it by collecting, and, in many instances, when refused, it is eagerly taken by the museums and institutions of Europe. The extent and character of the recent additions to the collections may, perhaps, be better shown by the appended table than in any other way. This table shows comparatively the results of a census of the collections taken annually for the past six years, and from it it appears that the number of specimens, or of lots of

specimens, on hand at the close of the year is more than 2,800,000. These figures are in many instances estimated, and are always subject to revision.

Approximate number of specimens in the Museum in 1882 and received each year since.

Name of Department.	1882.	1883.	1884.	1885.	1885-'86.	1886-'87.	1887-'88.
Arts and industries:							
Materia medica.....		4,000	4,442		4,850	5,516	5,702
Foods.....		21,244	1,580		3822	4877	5877
Textiles.....			2,000		3,064	3,144	53,144
Fisheries.....			5,000		29,870	10,078	510,078
Animal products.....			1,000		2,792	2,822	52,822
Naval architecture.....			600				
Historical relics.....					1,002		
Coins, medals, paper money, etc.....					1,055	13,634	14,640
Musical instruments.....					400	417	427
Modern pottery, porcelain, and bronzes.....					2,278	2,238	3,011
Paints and dyes.....					377	100	5100
"The Catlin Gallery".....					500	500	5500
Physical apparatus.....					250	251	5251
Oils and gums.....					3197	198	5198
Chemical products.....					3659	661	5661
Ethnology			200,000		5500,000	503,764	505,464
American aboriginal pottery.....			12,000		25,000	526,022	527,122
Prehistoric anthropology.....	35,512	40,491	45,252		65,314	101,659	108,631
Mammals (skins and alcoholics).....	4,660	4,920	5,694		7,451	7,811	8,038
Birds.....	44,354	47,246	50,350		55,945	54,987	56,484
Bird's eggs.....			40,072		44,163	748,173	50,055
Reptiles and batrachians.....			23,495		25,344	27,542	27,664
Fishes.....	50,000	65,000	68,000		75,000	100,000	101,330
Mollusks.....	833,375		400,000		5460,000	425,000	455,000
Insects.....	1,000		10151,000		5500,000	5585,000	595,000
Marine invertebrates.....	811,781	814,825	6200,000		6350,000	5450,000	515,000
Comparative anatomy:							
Osteology.....	3,535	3,640	4,214	{	10,210	511,022	11,558
Anatomy.....	70	103	3,000				
Palæozoic fossils.....		20,000	73,000		80,482	84,491	81,649
Mesozoic fossils.....			100,000		69,742	70,775	70,925
Cenozoic fossils.....	(Included with mollusks.)						
Fossil plants.....		4,624	117,291		127,429	8,462	10,000
Recent plants.....					30,000	532,000	538,000
Minerals.....		14,550	16,610		18,401	18,601	21,896
Lithology and physical geology..	139,075	12,500	18,000		20,647	521,500	22,500
Metallurgy and economic geology.....		30,000	40,000		48,000	549,000	51,412
Living animals.....							220
Total	193,362	263,143	1,472,600		2,420,944	2,666,335	2,803,459

¹ No census of collection taken.

² Including paints, pigments, and oils.

³ Duplicates not included.

⁴ Foods only.

⁵ No entries of material received during the year have been made on the catalogue.

⁶ Estimated.

⁷ 2,235 are nests.

⁸ Catalogue entries.

⁹ Including Cenozoic fossils.

¹⁰ Professor Riley's collection numbers 15,000 specimens.

¹¹ Fossil and recent.

¹² Exclusive of Professor Ward's collection.

¹³ In reserve series.

It will be seen from this table that the number of specimens at the close of 1882 was approximately 193,362, and that this total has been increased during the next five and a half years to nearly 3,000,000. In other words, for twenty-two years (1859-1881) the average number of specimens received annually was less than 8,800; while during the last five years and a half the average number of specimens received annually has been nearly 475,000.

CATALOGUE ENTRIES.

The cataloguing of specimens is attended to by the curators of the several departments in the Museum. Each department has its book or set of books for this purpose, and until the catalogue entry has been made, the routine of recording the receipt of specimens is not complete. A catalogue entry may relate to a single specimen or to a large number of specimens, as, for instance, frequently happens in connection with marine invertebrates, insects, fossils, and other groups of objects. The number of catalogue entries during the year is, therefore, no indication of the total number of specimens added to the Museum collections.

As shown in the following table, the total number of catalogue entries for the year covered by this report is 26,891, while the total number of specimens received is estimated at more than 137,000.

Table showing the number of catalogue entries made during the year.

Name of department.	Total No. of entries.
Arts and industries:	
Materia medica	246
Textiles.....	21
Animal products.....	26
Fisheries	445
Historical relics, coins, badges, etc	552
Ethnology.....	790
American aboriginal pottery	1,542
Prehistoric anthropology.....	2,696
Mammals	337
Birds.....	2,206
Birds' eggs.....	487
Reptiles and batrachians.....	83
Fishes.....	450
Vertebrate fossils	22
Mollusks (including Cenozoic fossils)	11,799
Insects.....	56
Marine invertebrates (exclusive of mollusks).....	1,021
Comparative anatomy.....	536
Invertebrate fossils:	
Paleozoic.....	350
Mesozoic	30
Fossil plants	19
Recent plants	45
Minerals	347
Lithology and physical geology	1,203
Metallurgy and economic geology.....	1,413
Living animals	169
Total.....	26,891

INSTALLATION OF COLLECTIONS AND ASSIGNMENT OF SPACE.

Several attractive additions to the exhibition series in the Museum have been made during the past year, and the general appearance of the exhibition halls is now very satisfactory. An interesting contribution, consisting of a series of India proofs, from the Bureau of Engraving and Printing, has been received. On these are exhibited the backs and faces of all the current bonds and currency notes issued by the United States, illustrating each denomination of Treasury notes, gold and silver certificates, from \$1 to \$10,000, and coupon and registered bonds from \$10 to \$50,000. To the collection of historical relics has been added an object of rare interest. This is one of the thirteen pamphlets signed by George Washington, John Adams, and colonial delegates, entitled "Original Association of Congress, October 20, 1774". By this association the delegates pledged the colonies not to import British merchandise after December 1, 1774. The pamphlet consists of nine printed pages, more than two of which are devoted to the autograph signatures of the delegates. During the year the Smithsonian Institution has placed in the Museum its collection of portraits of scientific and literary men and other prominent personages. This series includes nearly 2,500 photographs, and is exceedingly valuable as a nucleus for a national gallery of portraits of representative men. The entire collection of materia medica has during the year been removed from the west north range of the Museum to the east-south range, and this transfer has made necessary a rearrangement of the collection. As mentioned in the report of Mr. True, curator of mammals, the idea of representing the more important mammals of North America by groups, accompanied by accessories indicative of the habits and natural surroundings of the species, which had been for some time under consideration, has been partly carried into execution, five groups having been placed in the exhibition hall, one of which, a group of bisons, is undoubtedly the finest work of its kind in the world. Work has been continued in the installation of the ethnological collection in the east and west halls. It has been impossible to make very rapid progress in the systematic rearrangement of the exhibition series of birds, but a satisfactory beginning in that direction has been made. The removal of the collection of reptiles and fishes from the west end of the Smithsonian Institution has been necessitated, in order that that portion of the building might be made fire-proof. This work having been completed, much time was spent in replacing these collections. An exhibition series of fishes has been installed in the west hall of the Smithsonian building. The collection of reptiles is still without exhibition space. The mollusk collection in the Museum is now in some respects, superior to any in the world. Important additions are constantly being made to it, and the work of installing an exhibition series of specimens is progressing steadily. The Department of Insects has placed on ex-

hibition a series of Coleoptera. Numerous additions to the exhibition series of osteological material have been made. The mineralogical collection has steadily increased, and additions have been made to the exhibition series of meteorites and to the gem collection. The cases containing the exhibition material of this department are very attractive and excite much interest on the part of visitors. More than two months were spent by the curator of lithology and his assistants in rearranging the exhibition material belonging to the department. The arrangement decided upon was such that the moving of nearly every specimen in the hall was made necessary. Since this rearrangement many important additions to the series have been made. A change in the space occupied by the Department of Metallurgy was made early in the year, the whole of the southwest court being assigned to the department, and the time and energy of the curator and his assistants, during the greater part of the year, have been devoted to the work of rearranging the exhibition material.

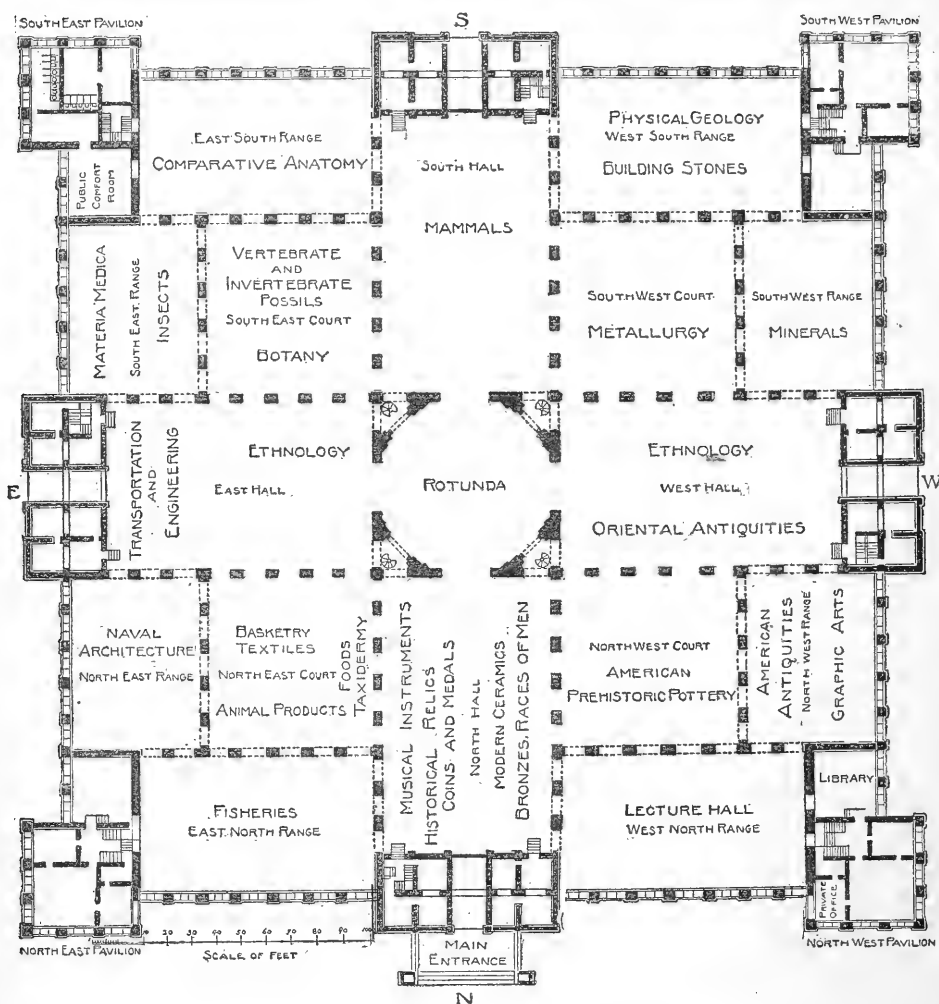
The Department of Living Animals, recently organized, has created wide interest. Many interesting specimens have already been obtained. The most important of these is a pair of buffaloes, presented by Hon. E. G. Blackford, of New York City.

Several important changes have been made in the assignment of space in the exhibition halls. The collection of modern ceramics and several special collections, such as the Capron collection of Japanese objects and the Hippisley collection of Chinese porcelains, have been placed on the west side of the north hall. A wall case, extending along the entire west side of the north hall, is devoted to collections representing the races of men and their domestic life. The scope of the collection belonging to the section of steam transportation has been enlarged to include transportation generally, and also to embrace the subject of engineering. The space assigned to these collections is the eastern end of the east hall.

The collections of prehistoric anthropology, of marine invertebrates, of fishes, of mollusks, and of reptiles are still retained in the Smithsonian building.

The north end of the west hall, from which the collection of modern pottery has been removed, is devoted to the section of Oriental Antiquities. The collection of metallurgy, including that portion of it which occupies the west end of the west hall, has been removed to the southwest court, the collection of minerals having been transferred to the southwest range in lieu of the metallurgical collection. In the southeast court, space has been assigned to the vertebrate and invertebrate fossil collections and to the Department of Botany.

The present assignments are shown in the accompanying plan:



E.—THE MUSEUM STAFF.

The staff of the Museum includes two classes—scientific and administrative—the former consisting of curators, honorary curators, acting curators, assistant curators, assistants and aids; the latter including the financial and clerical force, and the superintendent of buildings with the watchmen, mechanics, and laborers under his supervision.

THE SCIENTIFIC STAFF.

There are now in the Museum thirty-one organized departments and sections under the care of twenty-seven curators and assistant curators. Of these custodians, ten receive salaries from the Museum appropriations. Of the remaining seventeen, four are detailed from the U. S. Fish Commission, two from the U. S. Army, one from the U. S. Navy,

five from the U. S. Geological Survey, and one from the Bureau of Ethnology.

Dr. Charles Rau, for many years in charge of the archæological collection in the Museum, died on June 25, 1887. He was in 1881 appointed curator of the Department of Antiquities in the National Museum. His health gave way in 1886, and in July, 1887, he went to the hospital of the University of Pennsylvania, where he died. His body was brought to Washington, and was buried in Oak Hill Cemetery. Dr. Rau has been succeeded by Mr. Thomas Wilson, who received his appointment as honorary curator on December 1. In November Dr. H. G. Beyer, U. S. Navy, honorary curator of the Section of Materia Medica, was ordered to other duties, and Dr. James M. Flint, the first curator of this collection, has again taken charge. The Museum has commenced the formation of a collection of casts of Assyrian and Babylonian antiquities in association with the Johns Hopkins University. Dr. Paul Haupt, professor of Semitic languages in the Johns Hopkins University, was in February appointed honorary curator, Dr. Cyrus Adler, of the same university, consenting to act as honorary assistant curator. The Section of Transportation, under the care of Mr. J. E. Watkins, has now reached that point in its history where it may take rank with the other sections of the Department of Arts and Industries. On May 9 the Department of Living Animals was organized, with Mr. W. T. Hornaday, chief taxidermist, as curator. On June 8 Charles Wickliffe Beckham, formerly an assistant in the Department of Birds, died. He made several valuable contributions to American ornithological literature.

In other respects the personnel of the scientific departments in the Museum remains the same as in 1887, as shown in the following classified list:

I. ARTS AND INDUSTRIES, the Assistant Secretary acting as curator, with adjunct curatorships as follows:

ANIMAL PRODUCTS: R. Edward Earll, U. S. Fish Commission, acting curator.*

FOODS: W. O. Atwater, curator.*

FISHERIES: R. Edward Earll, acting curator.*

MATERIA MEDICA: James M. Flint, M. D., U. S. Navy, curator.*

TEXTILE INDUSTRIES: Romya Hitchcock, acting curator.†

HISTORICAL RELICS: A. Howard Clark, assistant curator.

TRANSPORTATION AND ENGINEERING: J. Elfreth Watkins, curator.

GRAPHIC ARTS: S. R. Koehler, acting curator.

NAVAL ARCHITECTURE: J. W. Collins, U. S. Fish Commission, curator.*

II. ETHNOLOGY: Otis T. Mason, curator; Walter Hough, aid.

AMERICAN ABORIGINAL POTTERY: W. H. Holmes, Bureau of Ethnology, curator.*

ORIENTAL ANTIQUITIES: Paul Haupt, curator;* Cyrus Adler, assistant curator.

III. PREHISTORIC ANTHROPOLOGY: Thomas Wilson.

IV. MAMMALS: F. W. True, curator; W. G. Stimpson, aid.

* Honorary.

† Absent in Japan.

- V. BIRDS: Robert Ridgway, curator; Leonard Stejneger, assistant curator.
 BIRD'S EGGS: Charles E. Bendire, U. S. Army, curator.*
- VI. REPTILES AND BATRACHIANS: H. C. Yarrow, M. D., curator.*
- VII. FISHES: Tarleton H. Bean, curator; * Barton A. Bean, aid.
- VIII. VERTEBRATE FOSSILS: O. C. Marsh, U. S. Geological Survey, curator.*
- IX. MOLLUSKS: W. H. Dall, U. S. Geological Survey, curator; * R. E. C. Stearns, adjunct curator.
- X. INSECTS: C. V. Riley, Department of Agriculture, curator; * J. B. Smith, assistant curator.
- XI. MARINE INVERTEBRATES: Richard Rathbun, U. S. Fish Commission, curator.*
- XII. COMPARATIVE ANATOMY: F. W. True, acting curator; F. A. Lucas, assistant curator.
- XIII. INVERTEBRATE FOSSILS:
 PALEOZOIC: C. D. Walcott, U. S. Geological Survey, curator.*
 MESOZOIC: C. A. White, U. S. Geological Survey, curator.*
 CENOZOIC: W. H. Dall, U. S. Geological Survey, curator.*
- XIV. FOSSIL PLANTS: Lester F. Ward, U. S. Geological Survey, curator; * F. H. Knowlton, assistant curator.
- XV. RECENT PLANTS: Lester F. Ward, U. S. Geological Survey, curator; * F. H. Knowlton, assistant curator.
- XVI. MINERALS: F. W. Clarke, U. S. Geological Survey, curator; * William S. Yeates, assistant curator.
- XVII. LITHOLOGY AND PHYSICAL GEOLOGY: George P. Merrill, curator.
- XVIII. METALLURGY AND ECONOMIC GEOLOGY: Fred. P. Dewey, curator.
- XIX. LIVING ANIMALS: William T. Hornaday, curator.

THE ADMINISTRATIVE STAFF.

There have been no important changes in the administrative corps during the year.

Mr. W. V. Cox, chief clerk, acted as representative of the Smithsonian Institution at the Minneapolis Industrial Exposition.

F.—REVIEW OF WORK IN THE SCIENTIFIC DEPARTMENTS.

The energies of several of the curators have been devoted during the greater part of the year to the preparation of exhibits for the Cincinnati Exposition. A report upon the participation of the Smithsonian Institution in this exposition, including statements in regard to the several exhibits, will be published in the report for 1889. This work has seriously interfered with the regular Museum duties of the curators, and has consequently diminished the amount of original research in the scientific departments of the Museum. It is a matter of regret that so few of the special collections in the Department of Arts and Industries have been formally reported upon this year. In many cases the curators of these collections are performing this work in an honorary capacity, and are compelled to devote the greater part of their time to the accomplishment of work connected with their official duties. Following the custom adopted in previous reports, I have briefly reviewed the work of each department separately.

* Honorary.

ARTS AND INDUSTRIES.

The organization of a new section of this department has been arranged. Dr. Paul Haupt, of Johns Hopkins University, Baltimore, has been appointed honorary curator of the collection of Oriental Antiquities, with Dr. Cyrus Adler, of the same university, as honorary assistant curator.

In connection with this arrangement the following circular, which has been approved by the Secretary of the Smithsonian Institution, has been published by the Johns Hopkins University:

Memorandum of the understanding between the National Museum and the Johns Hopkins University.

The National Museum at Washington has undertaken the formations of study collections of casts of Assyrian and Babylonian antiquities in association with the Johns Hopkins University of Baltimore. The two institutions will co-operate for this purpose, upon the following basis:

1st. The Museum stands ready to make fac-similes and casts of Assyrian and Babylonian antiquities.

2d. The attempt will first be made to obtain copies of the Assyrian antiquities preserved in this country.

3d. For the present the Museum will confine itself to the reproduction, in fac-simile and flat casts, of Assyrian and Babylonian seal cylinders.

4th. The Johns Hopkins University will attend to the proper arrangement and cataloguing of the Assyrian collection in the National Museum, under the supervision of Dr. Haupt, professor of Semitic languages, and Dr. Adler, assistant in the Semitic courses, who will also co-operate in the work of forming the collection and securing the loan of objects to be copied.

5th. Three sets of fac-similes and casts will be made in each case: the first to be preserved in the National Museum at Washington; the second to be transferred to the Semitic library of Johns Hopkins University, at Baltimore; and the third to be presented to the owners of the objects loaned.

Numerous and valuable additions have been made to the collection of graphic arts, under the energetic curatorship of Mr. S. R. Koehler. An interesting exhibit of illustrations of engraving, etching, and of the photo-mechanical processes, has been prepared by Mr. Koehler for the Cincinnati Exposition. A catalogue of this collection has been published in the appendix to the tenth volume of the Proceedings U. S. National Museum.* After the close of the Exposition the collection will be permanently installed in the National Museum.

The collection of *Materia Medica* is now under the care of the former honorary curator, Dr. James M. Flint, U. S. Navy, Dr. H. G. Beyer, U. S. Navy, having been ordered to other duty by the Navy Department. A collection of Korean drugs has been purchased, and is of much importance in completing the series of drugs from that country. The entire collection is now installed in the east-south range. During the year 246 specimens have been added to the collection.

The collection of historical and personal relics, under the care of Mr. A. H. Clark, has received some interesting additions, among which is the war saddle of General Grant, deposited by General A. H. Markland. From Mr. Stephen Vail has been received a piece of the original wire over

which a message was sent in 1840 during the experiments of Professor Morse.

The War Department has transferred to the National Museum several interesting relics, including a large section of an oak tree riddled with bullets from the battle-field at Appomattox Court-House. The original plaster model of the bronze statue of George Washington, designed by William Rudolf O'Donovan, has been received. A pair of silver-mounted flint-lock pistols, once the property of General Lafayette, has been deposited by Mr. William Burnett. The Smithsonian Institution has transferred to the Museum its collection of portraits of American and foreign men of science and of persons prominent in political and civil life. The Museum had already accumulated engraved and photographic portraits, and plans are now being arranged for the formation of a comprehensive collection, in which especial attention will be given to the representative men of America.

The collection of coins, medals, and paper money has been gradually increased. A series of proofs of all the current bonds and currency notes issued by the United States, and of gold and silver certificates, coupons, and registered bonds, has, through the courtesy of Hon. E. O. Graves, been presented by the Bureau of Engraving and Printing.

During the year, 1,006 specimens have been added to the collection, and 552 entries have been made in the catalogue.

ETHNOLOGY.

Prof. Otis T. Mason, curator, has pushed forward work in connection with the ethnological series, the object of which is to show representatives of all the races of men. The arrangement of the Eskimo collection, which was commenced last year by Lieut. T. Dix Bolles, U. S. Navy, has been completed. The curator is arranging for comparison the bows and arrows from all parts of the world, with a view to preparing an extensive monograph upon the subject. Prof. G. Stanley Hall investigated the subject of mythology from the psycho-physical point of view, and was accorded the use of the ethnological collections of the Museum. An exceedingly valuable collection of objects from Easter Island has been placed in the Museum by Paymaster W. J. Thomson, U. S. Navy.

It is the intention of the curator to prepare each year for publication in the Museum report one or more papers relating to special collections illustrating the arts and industries of the North American Indians. In the report for 1884, two papers were published, on Throwing-sticks and on Basket-work of the North American Aborigines. In the report for 1887 were two papers by Professor Mason on Cradles of the American Aborigines and the Human Beast of Burden.

During the year, 1,700 specimens have been added to the collection, and 790 entries have been made in the catalogue.

AMERICAN ABORIGINAL POTTERY.

Mr. W. H. Holmes, honorary curator, has made a study of the origin and significance of the textile ornament upon the pottery of the eastern United States, and of the relation between the ancient and recent ceramic remains of northern New Mexico. The work of cataloguing and installing the immense collection of prehistoric pottery has practically been completed. Four collections of considerable importance have been received during the year: from Col. James Stevenson, of the Bureau of Ethnology, from Mr. James Mooney, from Mr. J. A. McNiel, and from Rev. Ward Batchelor, respectively.

During the year 1,100 specimens have been added to the collection, and 1,541 entries have been made in the catalogue, including the recording of collections which had been previously received.

PREHISTORIC ANTHROPOLOGY.

The curatorship of this department became vacant in July by the death of Dr. Charles Rau, and on December 1, 1887, Mr. Thomas Wilson was appointed curator. Mr. Wilson had been consul of the United States in Belgium and France, and had profited by his opportunities for the study of prehistoric anthropology in the localities in those countries which had become renowned for their bearings upon this science. He had while there made a collection of objects connected with prehistoric anthropology in Europe, amounting in number to 10,288 specimens, which he has deposited in the National Museum, and of which mention is made in the last annual report.

Dr. Rau bequeathed to the library 715 bound volumes and 1,722 unbound books and pamphlets. He also gave 89 modern Indian objects, 474 of European prehistoric objects, and 1,367 American prehistoric objects, to the ethnographical and archaeological collections in the Museum.

The special work of the curator during the year has consisted in gathering information concerning the existence and geographic distribution of paleolithic implements in the United States, it being the curator's desire to assist in the solution of the problem relating to the existence of man on the American continent, especially in the United States, during the paleolithic period of the stone age. In this connection a circular (No. 36) was prepared by the Smithsonian Institution for distribution among persons interested in archaeological matters. Several hundred replies were received. From these has been compiled a paper, including a discussion of the correspondence upon this subject and of deductions made therefrom, which is published in Section III of this Report.

During the year 6,972 specimens have been added to the collection, and 2,696 entries have been made in the catalogue.

MAMMALS.

The chief feature of the year's work in the Department of Mammals has been the rearrangement of the exhibition series in new cases, and considerable progress has been made. Mr. True, curator, reports that there has been received a smaller number of donations than in previous years, but that some excellent material has been obtained by purchase and exchange. A valuable series of deer-skins from Honduras was collected by Mr. Charles H. Townsend. A fine male Harnessed Antelope was presented by the Zoological Society of Philadelphia. Nearly sixty specimens have been mounted by the taxidermists.

During the year 247 specimens (skins and alcoholics) have been added to the collection, and 337 entries have been made in the catalogue.

BIRDS.

Mr. Robert Ridgway, curator, has prepared a review of the Mexican and Central American members of six families. Collections of birds from the Lower Amazon and from islands in the Caribbean Sea and on the coast of Honduras have been determined. The curator has written a monograph of the genera *Dendrocincla* and *Psittacula*.

Dr. Leonhard Stejneger, assistant curator, has continued his studies of the Japanese collection of birds belonging to the Museum, and has investigated several groups of European birds. He has also reported upon two collections of birds from the Hawaiian Islands.

For more than two months the time of the curator and his assistants was devoted to the preparation of an exhibit for the Cincinnati Exposition.

Both the exhibition and study series of this department have steadily improved during the year, and progress is being rapidly made in the systematic arrangement and classification of the immense amount of material which has been received both during this and previous years.

The curator of birds has called special attention to the fact that several species of North American birds are fast becoming extinct, and has emphasized the desirability of obtaining additional specimens of these species before it is too late. These species are: Great Auk, *Plautus impinnis*; Labrador Duck, *Camptolaimus labradorius*; Heath Hen, *Tympanuchus cupido*; Passenger Pigeon, *Ectopistes migratorius*; California Vulture, *Pseudogryphus californianus*; Carolina Paroquet, *Conurus carolinensis*; and Ivory-billed Woodpecker, *Campephilus principalis*.

The first of these, the Great Auk, is now believed to be entirely extinct.

No specimens of the Labrador Duck have been taken since April, 1871. Formerly specimens were occasionally taken about Grand Manan Island, near Eastport, Maine.

Until within the last two or three years specimens of the Heath Hen were occasionally found on Martha's Vineyard and on the island of

Naushon. Mr. William Brewster thinks that its extinction is due to the numerous foxes found on those islands.

The Passenger Pigeon is still found in small numbers, but it is thought that it will not be many years before this species will be entirely extinct.

The California Vulture is becoming rarer each year. Large numbers of these birds have been destroyed by eating poisoned meat intended for other animals.

The Carolina Paroquet is being rapidly destroyed for its plumage, and few specimens are now left. Whole flocks can be killed easily, since, when one has been wounded, the remainder will stay by it and can not be frightened away.

The Ivory-billed Woodpecker is rapidly diminishing in numbers. No special reason has been assigned for its decrease.

Capt. Charles E. Bendire, curator of birds' eggs, has added to the above list the name of Pallas's Cormorant, *Phalacrocorax perspicillatus*. This species became extinct about thirty-five years ago on the Commander Islands. It is especially desirable to retain specimens of this bird, since only three skins have been preserved. It is believed that no skeleton or egg of this bird exists in any collection. This is a very fine bird, the largest of its family, and is provided with a lustrous plumage of burnished green and purple.

In June, 1888, the Museum lost by death the services of Charles Wickliffe Beckham. During his brief connection with the Museum Mr. Beckham proved himself to be an intelligent and valuable assistant.

During the year 1,497 specimens have been added to the collection, and 2,206 entries have been made in the catalogue.

BIRDS' EGGS.

Capt. Charles E. Bendire, U. S. Army, honorary curator, has continued the work of measuring, numbering, and rearranging the collection, and 1,778 specimens have been thus disposed of during the year. The relabeling of the reserve series, in accordance with the nomenclature adopted by the American Ornithologists' Union, has also been commenced.

The principal contributions during the year have been received from Lieut. H. C. Benson, U. S. Army, Dr. J. C. Merrill, U. S. Army, Dr. A. K. Fisher, and Dr. C. Hart Merriam, of the Department of Agriculture; Mr. F. Stephens, of San Bernardino, California, and Col. N. G. Goss, of Topeka, Kansas.

During the year 1,882 specimens have been added to the collection, and 487 entries have been made in the catalogue.

REPTILES AND BATRACHIANS.

The operations of this department have been seriously interrupted by the necessity of making some repairs in the west basement of the Smith-

sonian building. This work lasted for several months. The entire reserve series has been transferred from the laboratory of the department to store-rooms. After the repairs had been completed, the collection was again transferred to its former position. This series has, to a great extent, been relabeled and systematically arranged.

Studies upon the Batrachia in the Museum have been continued by Prof. E. D. Cope, of Philadelphia.

The curator, Dr. H. C. Yarrow, has investigated the subject of rattlesnake venom, with a view to determining its action upon animals, and numerous experiments have been made with so-called antidotes for the venom. A popular account of these experiments was published in "Forest and Stream," in May and June, 1888, and a final statement of the results of his investigations will be published in a future report of the Museum.

During the year 122 specimens have been added to the collection, and 83 entries have been made in the catalogue.

FISHES.

Dr. Tarleton H. Bean, honorary curator, was directed by the U. S. Commissioner of Fisheries to investigate the fishes of Great Egg Harbor Bay, New Jersey, and in July, 1887, left Washington for that purpose. The results of this investigation have been embodied in a paper prepared by him for publication.

Great disorder to the collection has been caused by the necessary removal of the exhibition series of fishes from the hall during the fire-proofing of the west end of the Smithsonian building. Immediately after the completion of this work the collections were returned to their places.

In 1888 Dr. Bean was ordered by the U. S. Commissioner of Fisheries to join the U. S. Fish Commission schooner *Grampus* for the purpose of investigating the southern mackerel fishery, and this cruise occupied his time during May and June, 1888.

The growth of the collection in this department during the year has been very satisfactory. Special work was accomplished on collections received from Ensign W. E. Safford, U. S. Navy, C. H. Townsend, and Señor Don José Arechavaleta. A small collection of fishes from Honduras was received from Mr. C. H. Townsend and reported upon. The collections of fishes made by the U. S. Fish Commission steamer *Albatross* and the U. S. Fish Commission schooner *Grampus* have been catalogued and preserved. Types of several new species have been obtained, and descriptions of these have been prepared for publication in the Proceedings of the National Museum. The curator states in his report that 62 accessions have been received, representing nearly every State and Territory.

During the year 1,350 specimens have been added to the collection, and 450 entries have been made in the catalogue.

MOLLUSKS.

A large portion of the time of the curator and his corps of assistants has been spent in unpacking, labeling, and repacking the large and valuable collection of mollusks bequeathed to the Smithsonian Institution by the late Dr. Isaac Lea, of Philadelphia. This collection includes about 20,000 specimens, and a description of it will be found in the report of Mr. William H. Dall, honorary curator.

Special investigations have been made in connection with the deep-sea mollusks collected by the steamers *Blake* and *Albatross* on the eastern coast of the United States and among the Antilles. A study of the fauna of the Miocene Silex beds of Tampa Bay has been made. Mr. Dall has also found time to study the relations of the members of the Tertiary mollusk fauna with the recent species of the coast.

The condition of the collection is now very satisfactory, and the curator estimates that during the year 30,000 additional specimens have been added.

Dr. R. E. C. Stearns, adjunct curator, has devoted his time to arranging, classifying, and labeling the collections, and, in addition to the routine work of the department, has prepared for publication several papers based upon museum material. A list of these papers will be found in Section IV of this report.

During the year at least 30,000 specimens have been added to the collection, and 11,799 entries (including Cenozoic fossils) have been made in the catalogue books.

INSECTS.

Considerable progress has been made in connection with the arrangement of material in the Department of Insects during the year. Owing to lack of room it has not been possible to properly expand and arrange the collections, and additional space is urgently needed. Early in the year the arrangement of Coleoptera and of the large Bombycid Lepidoptera was commenced. Studies were made of some of the genera of the Noctuidæ. The annotative and critical overhauling of the Glover plates, with the view of possibly preparing them for publication, occupied a large part of the first half of the year.

Requests sent to this department for the determination of material have been very numerous, and much time has been consumed in identifying specimens. The questions submitted as to the life habits, methods of collecting, and determination of insects, often require considerable research. Prof. C. V. Riley, honorary curator, states in his report that not less than one hundred and fifty letters, reporting names and habits of specimens sent for determination, were written during the year. The number of accessions received was not as large as last year, but their value is fully equal to that of the accessions of the previous year. The preservation of the material in this department requires great care, and much time is required to protect these specimens from museum pests.

The curator has visited Europe during the year, and consulted a number of correspondents and specialists in reference to entomological work in other museums.

Mr. J. B. Smith, assistant curator, has, in addition to performing the routine work of the department, prepared for publication a number of entomological papers, a list of which will be found in Section IV of this Report. Several important investigations have been conducted during the year by the curator, assistant curator, and co-workers of the department.

During the year about 10,000 specimens have been added to the collection, and 56 entries have been made in the catalogue.

MARINE INVERTEBRATES.

In consequence of increased duties in connection with the work of the U. S. Fish Commission, Mr. Rathbun, honorary curator of this department, has been unable to devote as much time as in previous years to museum work. The repairs which have been made in the west portion of the Smithsonian building have interfered seriously with the routine work of this department. The investigations of the curator have related chiefly to subjects bearing more or less directly on problems connected with the work of the U. S. Fish Commission. Seventeen of the thirty-three accessions received during the year were contributed by or through the medium of the U. S. Fish Commission. The current work of the department has been kept up and all the accessions of the year have been properly cared for.

A large number of duplicate sets of specimens of marine invertebrates have been distributed during the year to various schools and universities. This material has been courteously placed at the disposal of the Smithsonian Institution for this purpose by the U. S. Commissioner of Fisheries. As in former years this department has received the benefit of the co-operation of many eminent specialists, and members of the scientific staff in the service of the U. S. Fish Commission have rendered very valuable assistance in their special lines of study.

During the year about 65,000 specimens have been added to the collection, and 1,021 entries have been made in the catalogue.

COMPARATIVE ANATOMY.

No special investigations have been made in connection with the material in this department, the work of research having been necessarily subordinated to that of identifying, cataloguing, and preserving the specimens received during the year.

The total number of specimens received during the year is 536, including skulls, and skeletons of mammals, birds, reptiles, and fishes. One of the most important accessions is a series of bones of the extinct Dodo, received from Cambridge, England.

The work of labeling the exhibition series has made progress.

PALEOZOIC INVERTEBRATE FOSSILS.

The principal work of the year in the department of paleozoic fossils has been the preparation by Mr. C. D. Walcott, honorary curator, of a representative series of fossils from each of the larger divisions of the Paleozoic strata. The series, comprising 10,955 specimens, is now on exhibition, and has been provided with labels.

The curator was absent from the city seven months of the year in connection with the work of the U. S. Geological Survey. During the remainder of the year he devoted a large portion of his time to the preparation of a paper on "The Taconic System of Emmons, and the use of the name Taconic in Geologic Nomenclature."

During the year 158 specimens have been added to the collection, and 350 entries have been made in the catalogue.

MESOZOIC INVERTEBRATE FOSSILS.

Dr. C. A. White, honorary curator, states in his annual report that it has been necessary to devote the greater part of his time to the paleontological work of the U. S. Geological Survey. A great deal has been accomplished, however, in the identification of material sent for examination and in replying to letters addressed to the Museum asking for information upon paleontological subjects.

The most important accession of the year has been the Lea collection of fossils, forming a part of the extensive collections bequeathed by the late Dr. Isaac Lea to the Smithsonian Institution. A card catalogue of the collection has been made. No specimens have yet been placed upon exhibition, although a series of specimens representing the Mesozoic formation of North America is ready for exhibition as soon as cases shall have been provided. Some important papers have been published during the year by the curator. These are referred to in Section IV (Bibliography) of this Report.

During the year 150 specimens have been added to the collection, and 30 entries have been made in the catalogue.

FOSSIL AND RECENT PLANTS.

Almost the entire time of Mr. Lester F. Ward, honorary curator, has been devoted to his work as an officer of the U. S. Geological Survey. Considerable progress has been made by Prof. Leo Lesquereux, of Columbus, Ohio, in the identification of material collected in Oregon by Capt. Charles E. Bendire. Professor Lesquereux's report was edited and prepared for publication in the Proceedings of the U. S. National Museum by Mr. F. H. Knowlton, assistant curator of this department.

Mr. Knowlton continued his studies on the internal structure of fossil plants and reached some interesting results. He also made an examination of fossil wood collected in the Yellowstone National Park.

In July, 1887, the curator, accompanied by the assistant curator, left Washington on an expedition to the Yellowstone National Park, the

primary object of this expedition being to collect fossil plants in this region. About 25 species of mosses and 300 species of flowering plants were also obtained.

During the past two years a special study of the flora of the District of Columbia has been made, one of the results of which is that there are now in the herbarium about 1,000 species of plants from this locality. The curator states that several valuable accessions have been received, the principal one being the collection made by Edward Palmer, in Mexico. This contains 768 species. Second in size, but none the less valuable, is the Mexican collection made by C. G. Pringle.

The routine work of the department has been well attended to, and the present state of the collection is very satisfactory.

During the year 1,538 specimens of fossil plants have been added to the collection, and 19 entries have been made in the catalogue. There have also been received 6,000 specimens of recent plants. These have been catalogued under 347 numbers.

MINERALS.

Prof. F. W. Clarke, honorary curator, reports that gifts of minerals have been received from many sources, and that valuable additions have been made to the collections of meteorites and gems.

A collection of gems and precious stones was prepared for exhibition at the Cincinnati Exposition, and some valuable additional specimens were obtained.

The largest accession of the year is the collection bequeathed by the late Dr. Isaac Lea. The U. S. Geological Survey has, as usual, made large and valuable contributions to the collection, especially important being the minerals collected by officers of the Survey at Denver, Colorado.

The greater part of the routine work of the department has been carried on by Mr. William H. Yeates, assistant curator, who has devoted much time to cataloguing and labeling.

During the year 3,295 specimens have been added to the collection, and 347 entries have been made in the catalogue.

LITHOLOGY AND PHYSICAL GEOLOGY.

The curator, Mr. George P. Merrill, has devoted the greater part of his time to the preparation of the exhibition, study, and duplicate series. He has also completed the manuscript for a hand-book of the building-stone collection. This contains not only a catalogue of the Museum collection, but also a description of the principal quarries in the United States, information in regard to the structure and composition of rocks, methods of quarrying, results of pressure tests, and other associated subjects.

During the year the storage material belonging to this department

has been thoroughly overhauled, with a view to eliminating all worthless specimens.

The preparation of sets of duplicate material has been commenced, in order to meet the requests of educational institutions for collections of this kind.

Special researches have been made upon the Montville serpentine and the peridotite from Little Deer Island on the coast of Maine, and upon a new meteorite from California. Papers relating to these specimens have been prepared for publication in the Proceedings of the National Museum.

The curator has paid especial attention to the stratigraphic, structural, and dynamical geology exhibition series, and many important additions have been made during the year. In the annual report of this department, seventeen accessions are mentioned as of especial importance, among which are a large collection of eruptive rocks, minerals, veins, and joint formations collected by the curator in New Jersey, Rhode Island, Massachusetts, and Maine, and an interesting series of Devonian marbles and eruptive rocks sent in exchange by Mr. R. N. Worth, curator of petrology in the Plymouth Institute at Plymouth, England. Valuable contributions have also been received from officers of the U. S. Geological Survey.

During the year, 1,000 specimens have been received.

METALLURGY.

The energies of the curator, Mr. F. P. Dewey, and his assistants, have been devoted during the year to work incident to the change in the location of the exhibition space of the department. A complete reorganization of the geographical series of ores has been effected, and some changes have been made in the systematic collections in economic geology and metallurgy. The curator has prosecuted special researches in regard to the perfecting of the Hampe method of determining suboxide of copper in metallic copper, in order to carry on a further investigation upon the refining of pig-copper. He has also made a complete chemical examination of the large collection from the Lone Elm Smelting Works at Joplin, Missouri. To accomplish this it was necessary to make sixteen chemical analyses.

During the year, 101 accessions were received. Of this number, 72 consisted of specimens sent for examination and report. Two important collections were contributed by the U. S. Geological Survey. One of these was collected by Mr. J. S. Curtis in connection with the preparation of a report upon the silver-lead district of Eureka, Nevada; the other was collected by Mr. S. F. Emmons, who is preparing a report upon the geology of Leadville, Colorado.

The total number of specimens in the department is about 51,000, of which 18,000 are in the exhibition series.

During the year 2,412 specimens have been added to the collection, and 1,413 entries have been made in the catalogue.

LIVING ANIMALS.

This department was formally organized May 12, 1888, Mr. William T. Hornaday being appointed curator. For a long time past, the need of living animals had been felt to serve as models for the taxidermists, and, through the courtesy of the U. S. Fish Commission, arrangements were made for Mr. Hornaday to accompany one of the cars belonging to the Commission with a view to securing living specimens. On October 8, Mr. Hornaday left Washington, visiting points in Minnesota, Dakota, Montana, Washington Territory, Oregon, Utah, and Wyoming. This expedition resulted in the acquisition of seventeen animals. Mr. J. Frank Ellis, of the U. S. Fish Commission, and his assistant, Mr. R. S. Johnson, rendered valuable assistance to the Museum in connection with the transportation of these animals to Washington.

A wooden structure for their reception was erected immediately south of the Smithsonian Building, and on December 31, 1887, it was thrown open to the public. Since then a large number of valuable contributions have been received, among which are a fine jaguar from Mr. J. W. Riddle, of Eagle Pass, Texas, and two black bears from Mr. J. E. Linberg, of El Paso, Texas. The most important accession is a pair of buffaloes from Nebraska. These were purchased by Hon. E. G. Blackford, of New York, and presented to the Smithsonian Institution. The collection has been steadily increasing, and it is hoped that during the next session of Congress an appropriation will be made for the purchase of land with a view to forming a National Zoological Park. Special thanks are due to the United States Express Company for having made generous reductions in the rates of transportation on living animals, the agents of the company having been instructed to ship living specimens to this Institution at ordinary merchandise rates.

G.—REVIEW OF THE ADMINISTRATIVE WORK.

PROGRESS OF GENERAL AND INCIDENTAL WORK.

LIBRARY.

Mr. John Murdoch, librarian, has submitted the following statement in regard to the operations of the library during the year:

The total number of publications added to the library during the year was 6,063 (1,316 volumes of more than 100 pages, 1,436 pamphlets, 3,169 parts of regular serials, and 142 charts). Of these, 437 volumes, 953 pamphlets, and 1,655 parts of serials were retained for the use of the Museum from the accessions of the Smithsonian Institution.

The remainder was obtained, as usual, by gift, and, less frequently, by purchase.

The most important accession to the library during the year was the bequest of the late curator of Archæology, Dr. Charles Rau, of his archæological and general library, comprising 2,437 volumes and pamphlets, many of very great value. Of these, 408 have already been entered and catalogued.

When finished, these books will form the "Rau Memorial Library," and will be assigned to the sectional library of archæology.

Other important donations were as follows: From the estate of the late Prof. S. F. Baird, 65 volumes, 21 pamphlets, 303 parts of serials, and 3 charts; from Prof. Charles U. Shepard, of Charleston, South Carolina, 134 volumes and 5 pamphlets from the chemical library of his distinguished father. (This donation was made at the suggestion of Prof. F. W. Clarke, chief chemist, U. S. Geological Survey.) From Dr. George E. Horn, of Philadelphia, a complete set of "separates" of his entomological papers, comprising 44 pamphlets.

During the year 5,492 books were borrowed from the library and 3,023 returned. Ninety-four persons are now authorized under the regulations to draw books from the Museum Library, and of these 73 are also authorized to obtain books from the Library of Congress through the Museum Library. Two hundred and ninety-eight orders were sent to the Library of Congress during the year.

The "Ledger of Books Issued" having grown so bulky and so inconvenient, on account of the impossibility of alphabetical arrangement, it was decided to try the experiment of transferring the charges on this book to separate slips, which could be filed in alphabetical order. When these slips were prepared by the copyist they were carefully compared with the records by the librarian in person, who then canceled the old record. The slips used are of uniform size, one-fourth of the standard octavo. When a book is issued the title, with the name of the borrower and date of issue, is written on one of these slips, which are kept by themselves for the day, and counted and filed the first thing on the following morning. On the return of the book the slip is removed from the file and canceled. The receipts of each borrower are kept as before, but are filed alphabetically instead of by their dates. The experiment has proved entirely successful. It is calculated that at least half the time formerly consumed in recording loans is now saved, and there is a distinct increase in accuracy. The success of this experiment induced the librarian to use the same method in keeping the accounts with the Library of Congress, as a great deal of time was wasted whenever it was necessary to learn whether a certain book had been drawn from the Library or when one had been returned. Of the latter we had no record except the unindexed file of canceled receipts, bound in a clumsy volume. At present, one alphabetical file of slips gives the titles of all books drawn from the Library of Congress, with the date

of withdrawal of each; another shows the titles of all that have been returned with the date of withdrawal and return. These two files thus give a complete history of our dealings with the Congressional Library.

When a book is received from the Library its title is immediately written on a slip, which is stamped with the date and filed at once. On its return to the Library of Congress this slip is removed from the file of "Borrowed," stamped with the date, and filed as "Returned." This system, which has been in operation since the latter part of March, has proved entirely satisfactory.

The card-catalogue by authors has been continued, and 2,829 titles have been added to it during the year. It is still impossible to begin the much-needed catalogue of subjects.

Sectional libraries.—An inspection of the sectional libraries was begun April 2, 1888, and completed June 15, 1888. All the sectional libraries were visited by the librarian in person, and the books found in them carefully compared with the receipts given by the gentlemen in charge of the sections. At the same time the titles of all books permanently assigned to each sectional library were transferred from the ordinary "call-cards" to a special form of receipt (approved by the Secretary). These sectional library receipts are filed separately from the receipts given by curators and others for books borrowed by them personally and not for the use of the section. Thus the receipts for each sectional library form a catalogue of the books in that library. At the close of the inspection each curator was furnished with a list of the books in his sectional library.

The sectional libraries, the establishment of which has been authorized, are nineteen in number, namely: (1) Administration; (2) Archaeology; (3) Assistant Secretary Smithsonian Institution; (4) Birds; (5) Chief Clerk Smithsonian Institution; (6) Editor Smithsonian Institution; (7) Ethnology; (8) Fishes; (9) Insects; (10) Lithology and Physical Geology; (11) Mammals; (12) Marine Invertebrates; (13) Materia Medica; (14) Mesozoic Fossils; (15) Metallurgy and Economic Geology; (16) Mineralogy; (17) Mollusks and Cenozoic Fossils; (18) Plants, recent and fossil; (19) Textiles and Foods.

Of these, Nos. 1, 3, and 5 have never been organized, while it has been found convenient for purposes of administration to divide the library of the section of Minerals into two divisions—(a) consisting chiefly of works on chemistry, and kept in the office of the honorary curator and under his immediate charge, and (b) containing most of the strictly mineralogical books, and kept in the mineral laboratory, in charge of the assistant curator.

The following is the result of the inspection:

Archæology.—This library was organized December 14, 1887, on the appointment of the new curator, and therefore not reinspected. On June 1, 1888, it contained 50 volumes and pamphlets and 13 parts of serials. When the Rau Memorial Library is entered and catalogued it will be assigned to this section.

Birds.—Inspected April 2, 1888; contains 462 volumes and pamphlets and 183 parts of serials. These are generally in good condition, though many of the large books are of necessity exposed to dust from lack of suitable cases. This sectional library was founded before the Museum library was organized, and was found to contain many books belonging to the Smithsonian Institution of which the librarian had no record. These were all properly catalogued and recorded.

Editor Smithsonian Institution.—Inspected June 8, 1888; contains 642 volumes and pamphlets and 390 parts of serials, all in good order.

Ethnology.—Inspected April 28, 1888; contains 61 volumes and pamphlets, 98 parts of serials, and 1 chart, in good condition.

Fishes.—Inspected April 18, 1888; contains 137 volumes and pamphlets and 12 parts of serials, in good condition, kept in suitable cases with standard Museum locks.

Insects.—Inspected June 5, 1888; contains 390 volumes and pamphlets and 343 parts of serials, in good condition, kept in a case with standard Museum lock. More case room is needed.

Lithology and physical geology.—Inspected May 3, 1888; contains 312 volumes and pamphlets and 127 parts of serials, in good condition. The curator has two cases with standard Museum locks, which hold about three-fourths of these books, while the rest are on open shelves.

Mammals.—Inspected May 28, 1888; contains 410 volumes and pamphlets, in good order. The curator has not a sufficient number of cases to contain these books.

Marine invertebrates.—Inspected April 14, 1888; contains 115 volumes and pamphlets and 118 charts, all in good condition, and kept in cases with standard Museum locks.

Materia medica.—Inspected April 23, 1888; contains 194 volumes and pamphlets and 130 parts of serials, in good condition. About half of the books are kept in a suitable case, provided with the standard Museum lock, and the rest are on open shelves.

Mesozoic fossils.—Inspected May 17, 1888; contains 36 volumes and pamphlets in good order, kept on open shelves.

Metallurgy and economic geology.—Inspected May 10, 1888; contains 349 volumes and pamphlets and 94 parts of serials, in good condition and very carefully arranged by the curator. There are six good cases, amply sufficient to hold all these books.

Mineralogy.—(a) Inspected June 4, 1888; contains 142 volumes and pamphlets and 228 parts of serials, in good order and kept in suitable cases. (b) Inspected May 16, 1888; contains 98 volumes and pamphlets in good order and kept in a suitable case, with standard Museum locks.

Mollusks and Cenozoic fossils.—Inspected April 21, 1888; contains 74 volumes and pamphlets and 34 parts of serials, in good order, kept in a locked case.

Plants, recent and fossil.—Inspected May 13, 1888; contains 320 vol-

umes and pamphlets and 339 parts of serials, kept in various rooms on the south balcony and on shelves on the balcony.

Textiles and foods.—Owing to the temporary absence of the curator and the inability of the assistant left in charge to take proper care of the books in this library, they have been recalled to the central library. On the return of the curator this sectional library will be reorganized.

It seems undesirable, and, indeed, hardly practicable to endeavor to enforce the regulation which requires that books belonging to a sectional library shall be kept separate from all other books. The books in a specialist's library are naturally arranged according to subjects, which necessarily brings together books belonging to the sectional library, the Library of Congress, and even the author himself.

Binding.—One hundred volumes belonging to the Museum were sent to the Government Bindery late in the year and were all returned on or before June 29. Considerable progress has been made in putting the pamphlets into suitable covers; but this work has been partially suspended on account of the exhaustion of the appropriation for the purchase of these covers.

Progress has also been made in arranging the pamphlets in the pamphlet boxes mentioned in my last report, but this work has necessarily been slow, since the routine work, as will be seen from the very large number of books issued, returned, and catalogued, has occupied nearly all the time of the two employés in the library.

TRANSPORTATION AND STORAGE.

DISTRIBUTION OF DUPLICATES, AND EXCHANGES.

The total number of boxes, packages, barrels, tanks, etc., received during the year was 12,400, of which 1,911 contained material for the Museum collections, the remainder of the number being distributed to their proper addresses.

The registrar, Mr. S. C. Brown, has continued to act as transportation clerk for the Smithsonian Institution, thus adding much routine work to his duties as registrar.

During the year 405 packages were entered upon the storage record of the Museum. The storing of material is of very great convenience to the curators, who may not at the time of the arrival of the material for their department be able to work up the collection at once.

The number of packages sent out was 2,042, and of this number 264 contained Museum material sent out as gifts, loans, or in exchange. Photographs of cases and exhibits in the Museum have been sent to all who made application. Much labor was added to the work of this department in connection with the shipment of exhibits to the Ohio Valley Centennial Exposition. These filled twelve cars and consisted of five hundred and ninety-six packages, weighing in the aggregate 125,000 pounds.*

*A full account of the participation of the Smithsonian Institution in this exposition will be published in the report for 1888-'89.

The following table presents the number of specimens distributed by the Museum during the year:

Department.	No. of specimens.	Department.	No. of specimens.
Textiles	30	Mollusks	481
Historical relics	20	Marine invertebrates.....	24,750
Ethnology	839	Invertebrate fossils.....	20
American prehistoric pottery.....	6	Fossil and recent plants.....	300
Prehistoric anthropology.....	635	Minerals.....	545
Mammals	119	Rocks	327
Birds	1,068	Metallurgy.....	6
Birds' eggs	73	Total	29,408
Reptiles	174		
Fishes	15		

The greater part of the material distributed by the Department of Marine Invertebrates was sent out in sets, in response to applications which had been received from museums and other educational institutions.

The number of specimens distributed by the Smithsonian Institution since 1854 is shown in the following table:

1854 to 1881 inclusive.....	435,000	1885-'86	23,937
1882.....	12,391	1886-'87	11,000
1883.....	16,270	1887-'88	29,408
1884.....	21,084		
1885 (January to June).....	15,000	Total.....	564,090

A table showing approximately the number of duplicate specimens distributed to the end of 1880 has been prepared and may be of interest.

Nature of material.	Species.	Specimens.
Skeletons and skulls.....	588	1,945
Mammals	2,169	4,825
Birds	28,125	42,517
Reptiles	2,590	4,191
Fishes	10,903	14,639
Nests and eggs of birds	8,396	20,914
Insects	4,689	10,331
Crustaceans	1,097	2,689
Shells.....	90,722	197,873
Radiates.....	593	793
Other marine invertebrates	9,258	13,434
Plants and packages of seeds	30,496	53,030
Fossils.....	4,417	10,544
Minerals and rocks	10,250	21,737
Ethnological specimens.....	3,884	5,783
Diatomaceous earths (packages).....	1,176	2,010
Total	209,353	407,255

Sixty-four photographs of cases and exhibits were sent out in compliance with requests. Fifty-three applications for duplicate specimens have been received from individuals and institutions. Many of these have been filled and the remainder will be, as soon as the duplicate material can be arranged into sets for distribution.

A large number of exchanges of material of all kinds, especially geological specimens, has been completed during the year.

The National Museum takes this opportunity of extending its warmest thanks to the Alaska Commercial Company and other companies through whose kind offices the transportation of specimens has been effected at various times during the year.

FOREIGN EXCHANGES.

Several exchanges with foreign institutions have been carried on during the year. Among the more important the following may be mentioned:

A model of the Cabin Creek meteorite was sent to M. A. Daubrée, of the Museum d'Histoire Naturelle in Paris, and other models and photographs will be sent later. To S. H. Drew, Wanganui, New Zealand, was transmitted a collection of ethnological objects, and from him was received a collection of fossils. A small collection of archæological objects, numbering fifteen specimens, was transmitted to L. Guesde, Musée L'Herminier, Point à Pitre, from whom was received a collection of birdskins, numbering three hundred and twenty-eight specimens. A collection of one hundred and forty-one North American stone implements was sent in December to Sir Julius Von Haast, director of the Canterbury Museum, Christ Church, New Zealand. From Dr. E. Hamy, director of the Musée d'Ethnographie, in Paris, were received in exchange two boxes containing busts representing types of the human race. A collection of thirty-six specimens illustrating American aboriginal religion was sent to M. L. de Milloué, director of the Musée Guimet at Lyons. In exchange, specimens of Roman pottery and objects of Gallo-Roman interest in bone, stone, and bronze, as well as duplicates of Chinese and Japanese religious objects, have been promised. An exchange of bats has been arranged for with Signor Angelo Senna, of the Zoölogical Institute at Pavia, Italy. A collection of minerals, ores, and rocks was received from Mr. S. Sinclair, director of the Australian Museum, Sydney, New South Wales. Birdsksins, including two specimens of Namiye's Woodpecker, specimens of lacquer-work, meteoric stones, sapphire crystals, and a saddle from Loochoo, have been received from the Educational Department, Tokyo, Japan, and a collection of one hundred and seventeen birdskins has been sent in exchange.

Negotiations are still pending for exchanges of material with several other individuals and institutions.

PUBLICATIONS.

In June, 1888, the report on the operations of the National Museum for the first six months of 1885 was issued as Part II of the Annual Report of the Board of Regents of the Smithsonian Institution. This volume contains i-xi, 1-264 and i-vii, 1-939 pages, the latter series of pages constituting a paper by Hon. Thomas Donaldson, entitled "The George Catlin Indian Gallery." This is illustrated by one hundred and forty-two plates and two large maps, showing the bounds of Indian reservations.

The reports on the operations of the Museum for 1885-'86 and 1886-'87 are in type, and will soon be received from the Public Printer.

The ninth volume of "Proceedings of the U. S. National Museum," for 1886, was received from the Government Printing Office in August, 1887. Two hundred copies of this volume had already been received in "signatures" and distributed in that form to the principal scientific institutions, and also to a few individuals, in all parts of the world. The first signature was published on September 17, 1886, and the last on March 9, 1887. Volume 9 contains i-viii, 1-714 pages, and is illustrated by twenty-five full page plates, one of which is a chromo-lithograph, and a large number of text figures. The authors of papers in this volume are twenty-seven in number, namely: James E. Benedict, T. W. Blakiston, George H. Boehmer, Charles H. Bollman, E. D. Cope, W. H. Dall, George E. Doering, Charles L. Edwards, Carl H. Eigenmann, Barton W. Evermann, Fernando Ferrari-Perez, Morton W. Fordice, Charles H. Gilbert, Elizabeth G. Hughes, David S. Jordan, George N. Lawrence, John Belknap Marcou, William G. Mazyck, George P. Merrill, Richard Rathbun, Robert Ridgway, John A. Ryder, Rosa Smith, Leonhard Stejneger, John B. Smith, Frederick W. True, John Grant Wells. Nine of these are officially connected with the National Museum. The papers in this volume are sixty in number, and relate to the following subjects:

Subject.	No. of papers.	Subject.	No. of papers.
Birds	21	Naval architecture.....	1
Fishes	21	Materia medica.....	1
Mollusks	4	Invertebrate fossils.....	1
Mammals	4	Insects	1
Marine invertebrates	3	Lithology and physical geology.....	1
Reptiles	2	Total	60

Twenty-five signatures (Nos. 7-31 inclusive) of volume 10, Proceedings of the U. S. National Museum, have been published. During the months of February, March, April, May, and June, 1888, no signatures appeared,

Bulletin 32, "Catalogue of Batrachians and Reptiles of Central America and Mexico," by Prof. E. D. Cope, has been published during the year and contains 98 octavo pages. This catalogue is a systematic and synonymic description of Central American and Mexican species of Batrachia and Reptilia, largely based on material in the National Museum. To each species is added a list of the localities where it has been found, together with the name of the discoverer, or, in the absence of that, the name of the author who is responsible for the correctness of the locality. The total number of genera included in the catalogue is 197, and of species, 705, of which 135 are batrachians and 570 reptiles.

The manuscript for Bulletins No. 33, "Catalogue of Minerals and Synonyms, alphabetically arranged for the use of Museums," by Dr. Thomas Egleston, and No. 34, "Catalogue of Batrachians and Reptiles of North America," by Prof. E. D. Cope, is now in the hands of the Public Printer.

Mr. A. Howard Clark has faithfully continued his duties as editor of the Proceedings and Bulletin.

Circular No. 36 of the U. S. National Museum, concerning the Department of Prehistoric Anthropology, has been issued. The object of this circular is to obtain information concerning that class of American aboriginal stone implements which have heretofore been denominated "rude or unfinished implements of the paleolithic type." It is illustrated by cuts of several stone implements. This circular was widely distributed among archæologists and others interested in the subject, and much valuable information was elicited, which has been incorporated in a paper by the curator of prehistoric anthropology, and is published in Section III of this Report.

In Section IV of the Report will be found a list of the publications of the Museum, and also a bibliography of papers published by officers of the Museum and by collaborators, whose writings are based upon Museum material. The authors of these papers are 77 in number, of whom 35 are connected with the Museum, 14 being honorary officers. The total number of papers is 396, of which 311 are by Museum officers and 85 by other investigators, and are distributed under the following subjects:

Subjects.	Papers by Museum officers.	Papers by other investi- gators.	Total.
Administration	4	.....	4
Archæology	2	.....	2
Biography	5	.....	5
Biology	1	.....	1
Birds	43	35	78
Birds' eggs	4	.....	4
Chemistry	8	.....	8

Subjects.	Papers by Museum officers.	Papers by other investi- gators.	Total.
Ethnology	16	3	19
Entomology	77	2	79
Fisheries and fishing grounds	47	1	48
Fishery industries	2	.....	2
Fishes	16	9	25
Foods	1	.....	1
Fossil plants	6	.....	6
General natural history .....	.....	2	2
Geography and exploration	5	.....	5
History	1	.....	1
Invertebrate fossils	12	.....	12
Lithology and physical geology	7	.....	7
Mammals	4	10	14
Marine invertebrates	3	5	8
Materia medica	1	.....	1
Metallurgy	2	2	4
Minerals	7	.....	7
Miscellaneous (including reviews)	23	.....	23
Mollusks	2	1	3
Osteology and craniology	3	5	8
Plants	3	1	4
Physiology .....	.....	4	4
Reptiles	4	4	8
Textiles	1	.....	1
Thermotics	1	1	2
Total	311	85	396

VISITORS.

During the year the total number of visitors to the Museum building has been 249,665, and to the Smithsonian Building, 102,863.

The monthly register, as kept by the door-keepers, is here recorded:

	National Mu- seum Building.	Smithsonian Building.
1888.		
July	11, 817	5, 219
August	17, 290	7, 674
September	20, 820	9, 836
October	16, 109	6, 908
November	13, 161	5, 711
December	18, 135	7, 949
1889.		
January	18, 946	7, 698
February	25, 603	9, 773
March	30, 698	10, 089
April	24, 822	9, 822
May	33, 446	14, 546
June	18, 809	7, 638
Total	249, 665	102, 863
Approximate daily average	800	329

Table showing the number of visitors to the Museum and Smithsonian Buildings since the opening of the former in 1881.

Year.	Museum Building.	Smithsonian Building.	Total No. of visitors to both buildings.
1881.....	150,000	(?)	(?) 150,000
1882.....	167,455	152,744	320,199
1883.....	202,188	104,823	307,011
1884.....	195,322	91,130	286,452
1885 (January to June)	107,365	60,428	167,793
1885-'86	174,225	88,960	263,185
1886-'87	216,562	98,552	315,114
1887-'88	249,665	102,863	352,528
	1,462,782	699,500	2,162,282

LECTURES AND MEETINGS OF SOCIETIES.

Following the custom of previous years the use of the lecture hall has been granted for a series of lectures delivered under the joint auspices of the Biological and Anthropological Societies of Washington. Some of these lectures were delivered on Saturday afternoons, and others, illustrated by stereopticon views, on Friday evenings.

The course consisted of two series of lectures, the programme of each being as follows:

PROGRAMME OF THE FIRST SERIES.

February 18.—Prof. HERBERT B. ADAMS: University Extension in England, Baltimore, and Washington.

February 24.—Prof. WILLIAM LIBBY, JR.: Southeastern Alaska and its People.

March 3.—Prof. F. W. CLARKE: Chemical Analysis.

March 9.—Dr. GEORGE H. WILLIAMS: The Microscope in Geology.

March 17.—NATHANIEL H. EGGLESTON: The Origin of Our Names.

March 24.—Prof. PAUL HAUPT: Excavation in Assyria and Babylonia.

PROGRAMME OF THE SECOND SERIES.

March 31.—Prof. G. STANLEY HALL: Psychic Research in England, and the Recent Study of Hypnotism in France.

April 6.—Prof. H. CARRINGTON BOLTON: Glaciers.

April 14.—Dr. DAVID T. DAY: The Use of Natural Gas.

April 21.—Prof. T. C. MENDENHALL: Earthquake Measurements.

April 28.—Prof. OTIS T. MASON: Woman's Share in Primitive Culture.

May 5.—Maj. J. W. POWELL: The Course of Human Progress.

The members of the joint committee in charge of the arrangement of the lectures were Garrick Mallery, Frank Baker, J. S. Billings, W. H. Dall, J. R. Eastman, Robert Fletcher, G. K. Gilbert, G. Brown Goode, H. W. Henshaw, J. H. Kidder, Otis T. Mason, Washington Matthews, C. Hart Merriam, C. V. Riley, and R. S. Woodward,

The following table shows the number and dates of "Saturday lectures" delivered up to the close of the last season :

Year.	Date of first and last lecture.	No. of lectures.
1882.....	March 11, April 29.....	8
1883.....	January 13, March 31.....	12
1884.....	January 5, April 26.....	17
1885.....	February 7, May 2.....	12
1886.....	March 6, May 8.....	10
1887.....	March 12, May 7.....	12
1888.....	February 18, May 5.....	12
Total .....	.....	83

By permission of the Director of the Museum several societies have held their meetings in the Museum lecture hall. The following societies have availed themselves of this privilege during the year :

The National Academy of Sciences, on April 17, 18, 19, and 20.

The Botanical Section of the Biological Society of Washington, on April 4, May 3, and June 6.

The Biological Society, annual meeting, on February 1.

The Amateur Botanical Club of Washington, with the following program of special papers :

December 10, 1887.—Prof. MILES ROCK : The Guatemala Forests.

December 21.—Prof. J. W. CHICKERING : The Flora of Alaska.

January 7.—1888.—Prof. EDWARD S. BURGESS : The Fresh Water Algæ of the District.

January 21.—Dr. GEORGE VASEY : Some Important Medical Plants.

STUDENTS.

Free access has, as usual, been granted to students in the various branches of natural history. At the request of the Smithsonian Institution, and under the provision of section XIV of the act approved June 16, 1878, and section IV of article IX of the Police Regulation to kill birds within the District of Columbia for scientific purposes, permission has been given to several applicants to collect birds and bird's eggs in the District of Columbia.

Lieut. T. Dix Bolles, U. S. Navy, has been detailed by the Secretary of the Navy to special duty in the National Museum, and has accomplished a large amount of important work in connection with the classification of the extensive Eskimo collections in the Museum. Prof. G. Stanley Hall has devoted considerable time to an investigation of the subject of mythology from the psycho-physical point of view, and for this purpose has been granted access to the ethnological collections. Prof. E. D. Cope has continued his studies upon the Batrachia in the Museum collection. The unnamed species of *Acrididae* have been sent to Mr. Lawrence Brunner, of West Point, Nebraska, at his request, for study.

A selected series of *Lachnosterna* has been sent for study to Dr. George H. Horn, of Philadelphia. Mr. Tyler Townsend and Dr. George Marx, of the Department of Agriculture, have rendered valuable assistance in connection with the preparation of the entomological exhibit for the Cincinnati Exposition. Prof. A. E. Verrill has continued the study of several groups of marine invertebrates dredged by the Fish Commission on the eastern coast of the United States. Prof. S. I. Smith has received for study the crustacea gathered from the same source. Prof. Edwin Linton, of Washington and Jefferson College, has made rapid progress with his studies on Trematode parasites. Prof. Leslie A. Lee is intending to study the Foraminifera collected by the Fish Commission. Mr. J. Walter Fewkes, of the Museum of Comparative Zoology, at Cambridge, Massachusetts, has continued to report upon the free Medusæ collected by the U. S. Fish Commission steamer *Albatross*. Prof. Leo Lesquereux, of Columbus, Ohio, has been engaged in the identification of the fossil plants collected in Oregon by Capt. Charles E. Bendire, and has also determined the species of fossil plants from the John Day River region. His report on this material, including the description of several new species, has been prepared by Mr. F. H. Knowlton for publication in the Proceedings of the U. S. National Museum. A collection of mosses gathered in the Yellowstone National Park have been identified by Prof. Charles R. Barnes, of the University of Wisconsin, who has also identified the mosses collected by Messrs. Lucas and Palmer on the expedition sent out by the Fish Commission and the Smithsonian Institution to Funk Island in the summer of 1887. Dr. John W. Echfeldt, of Philadelphia, has identified several lots of lichens from various localities. Dr. T. F. Allen, of New York, has on several occasions identified specimens of *Characeæ*. Dr. George Vasey, botanist of the Department of Agriculture, has identified several sets of grasses from various places. Prof. L. H. Bailey, jr., of Cornell University, has examined the extensive series of mounted specimens in the herbarium representing the genus *Carex*. A series of American rocks was lent for study to Mr. J. S. Diller, of the U. S. Geological Survey. Mr. J. F. Kemp has published two papers describing the south-eastern Missouri lead region, basing his remarks upon collections which were made by him, and which formed a part of the exhibit of the Department of Metallurgy at the New Orleans Exhibition in 1884. These collections are now in the Museum. A drawing of *Pilocarpus pennatifolius* was lent for comparison to Dr. Clement Biddle, U. S. Navy. In accordance with the request of the Smithsonian Institution, July 11, the Navy Department detailed Paymaster William J. Thomson, U. S. S. *Mohican*, to enable him to complete his report on Easter Island, and upon the collections made by himself at that place. Mr. Henry Hemphill, of San Diego, California, has during the past year, as in previous years, rendered valuable assistance to the Department of Mollusks, and has presented much valuable and interesting material. Dr. Will-

iam H. Rush, U. S. Navy, has been a valued friend to the Museum, especially to the Department of Mollusks. Several persons have, as usual, received instruction in taxidermy and photography. A request made by Mr. Robert P. Bigelow for work room in the Museum was granted.

CURRENT ADMINISTRATIVE WORK.

BUILDINGS AND LABOR: POLICE AND PUBLIC COMFORT.

This department is under the charge of Henry Horan, superintendent of buildings.

At the beginning of the present fiscal year the staff employed for police and inspection, under the charge of Henry Horan, superintendent of buildings, consisted of 1 assistant superintendent, 12 watchmen, 5 door-keepers, 1 telephone operator, 1 copyist, 1 mail messenger; for construction, care of buildings and repairs, 4 carpenters, 2 painters; for labor and cleaning, 3 skilled laborers, 16 laborers, 7 cleaners, 2 attendants. For heating and lighting there was employed 1 engineer, with 6 firemen. Extra laborers have been employed from time to time, and particularly in connection with the preparation of the exhibit for the Cincinnati Exposition.

The following paragraphs contain a condensed summary of the most important work accomplished in each month:

1887.

July.—During this month the task of preparing an exhibit for the Minneapolis Exposition was commenced, under the general supervision of Mr. W. V. Cox, chief clerk. The work of packing and shipping the exhibit occupied the time of the greater part of the force until late in August, when Mr. C. A. Steuart, assistant superintendent of buildings, was sent to Minneapolis to superintend the work of unpacking and installing the exhibit. This work was completed on August 31, the opening day of the Exposition.

August.—During this month the work of removing the frame annex east of the Museum building was completed. The material thus obtained was utilized in the erection of work and storage sheds south of the Smithsonian building. Steam-pipes were laid, in order to connect these sheds with the boilers in the Smithsonian building. The collection of scientific instruments was removed from the north hall of the Museum building to a room specially fitted for its reception in the east wing of the Smithsonian building.

September.—Much of the time of the laborers during this month was occupied in rearranging the cases in the Anthropological hall of the Smithsonian building. A large collection of stone images, models of cliff dwellings, and other objects of great weight, was removed from the Museum building to this hall. This work necessitated great care in its execution. A cast of a whale in the south hall of the Museum building was removed from its base and suspended from the ceiling, thus affording additional floor space.

October.—During this month was commenced the erection of sheds south of the Smithsonian building. The arrangement of the material which had been removed from the Museum building to the Anthropological hall in the Smithsonian building was finished. The walls and ceilings in the basement of the Smithsonian building were whitewashed. The sewerage in the basement of the Smithsonian building was repaired. Thirteen walnut cases, formerly used in the Smithsonian building, were reconstructed, to conform to the needs of the Department of Metallurgy. The cases in the Department of Lithology and Physical Geology were re-arranged. The signal clocks throughout the buildings were put in order. Several pine cases were erected in the basement of the Smithsonian building for the use of the Department of Fishes.

November.—The principal work of the month consisted in unpacking the exhibit which had been returned from the Minneapolis Exposition. The rearrangement of the material in their cases occupied much time. Such articles as were not required for exhibition in the Museum were placed in storage. Alterations were made in the natural history laboratory, and the walls of the various rooms painted. Double doors were added to the Secretary's office.

December.—During this month the sheds south of the Smithsonian building were repaired and an additional shed was constructed. Cages and inclosures for the collection of living animals were constructed. Many of the exhibition cases throughout the buildings were repaired. Considerable work has been done in the Ornithological Department. Many of the bird-cases have been reconstructed, new shelving has been put in, and the cases have been painted inside and outside.

1888.

January.—A large number of cases hitherto in use in the north hall were removed to different parts of the Museum building. These were replaced with others, thus necessitating an entire rearrangement of the hall. This work occupied a large force of men during several days. The food collection was removed from the northwest range to the northeast court. The exhibit of the Entomological Department was removed from the southeast court to the southeast range. The cases in the hall devoted to the fishery exhibit were rearranged. Twelve mahogany cases were received for the exhibit of the Department of Graphic Arts and placed in position. Four plates of glass, each 9 feet by 7 feet 3 inches, were successfully set in the case containing the mounted group of bisons. The entire Materia Medica collection was rearranged. A plank walk was constructed around the carpenter shop. The rooms on the first floor east of the north entrance were fitted up for the accommodation of the engineer of property.

February.—During this month the east and west hall were rearranged under the supervision of Professor Mason, curator of the Department of Ethnology. The empty exhibition cases and other property were removed from the southeast court in order to make room for the exhibition of fossils and botanical specimens. The collection of tiles was removed from the west hall to the southwest range. Several war relics, which had been in the custody of the War Department, were transferred from the Winder Building by Museum laborers and placed on exhibition in the National Museum. A section of a large California tree was brought from the residence of Senator Leland Stanford. A storm-door was constructed at the north entrance to the Museum building. Much of the time during this and the following month was occupied in preparing the lecture hall for the annual course of Saturday lectures. Cases were placed in the reconstructed portion of the west wing of the Smithsonian building. A brick wall was built between the offices of the curator of fishes and of the curator of marine invertebrates. The steam-pipes leading to the sheds south of the Smithsonian building were covered.

March.—The Graphic Arts collection was placed in position. The exhibit illustrating the composition of the human body was removed from the northeast court to the southeast range. The material in the old Armory building was overhauled preparatory to a general cleaning.

April.—The objects of stone and iron were removed from the shed on the east side of the Museum building and the shed torn down. The lecture hall was fitted up for stereopticon exhibition in the day-time, the windows being provided with screens, so arranged as to be raised or lowered. Special preparations were made in arranging the lecture hall for the meetings of the National Academy of Sciences. Walks were laid to and from the shops in the rear of the Smithsonian building.

May.—The work of constructing feed and shelter houses and other inclosures for the collection of living animals occupied a considerable portion of the time of the laborers. The spouting on the various buildings was repaired. The awnings were repaired and placed on the windows.

June.—The work of preparing an exhibit for the Ohio Valley Exposition at Cincinnati was continued. A large additional force of mechanics and laborers was employed, and by June 30 ten car-loads of exhibits had been forwarded to Cincinnati. On June 25 Mr. Horan left for Cincinnati to superintend the arrangement of the exhibit, which had been placed under the general supervision of Mr. R. E. Earll.

During the last six months of this year two hundred and eighty-five lights of plate-glass have been fitted in the cases assigned to the Department of Birds, replacing the small lights of common glass hitherto in use in these cases.

ELECTRIC SERVICE.

In August, 1887, a contract was made with a firm of electricians of this city to furnish all material and labor necessary for putting in order the electrical service in the Museum and Smithsonian buildings, the cost being \$215. The work was satisfactorily completed. A further agreement was then made with the same firm to keep the electrical apparatus in order for the remainder of the fiscal year, furnishing all material and labor, for the sum of \$12.50 a month. The transfer of the electrical service from the care of an employé of the Museum to an outside firm has been made in the interest of economy, and has resulted very satisfactorily. The electric bells, other than those belonging to the Telephone Company, reaching twenty-eight points of the buildings, have been kept in good working order; the clock regulator has been cleaned and repaired; the watchmen's clocks, time dials, and station-boxes in both buildings, numbering twenty-two, have been overhauled and repaired; and all wires have been tested and repaired. The door-bells and burglar-alarms have been tested and are now in good order.

TELEPHONE SERVICE.

The work of this service has been very faithfully and intelligently performed by Miss M. L. Stone, who, in addition to her duties as telephone operator, has had charge of the Bureau of Information, the object of which is to reply to the numerous questions of visitors. The telephone switch-board has a capacity for making one hundred connections. At the present time there are only thirty-seven different circuits in use. There are two separate lines connecting the Museum with the central office in this city. The daily average number of calls through the year is about one hundred. During the year 34,318 connections have been made. Through this office telegrams may be sent by the Western Union Telegraph Company, the Baltimore and Ohio Telegraph Company, and the Government Department telegraph lines.

PROPERTY AND SUPPLIES.

While the general routine work of the Museum has been the same as in former years, some changes have been adopted which are leading to more satisfactory results.

It had heretofore been the custom, through the courtesy of the Department of the Interior, to avail ourselves of the bids received there, in obtaining our supplies, but our needs being widely different from those of all other departments of the Government, it was thought that an independent course might be more satisfactory. Consequently, in May, 1888, proposals were advertised for and contracts were awarded.

During this year Mr. J. E. Watkins, who was holding an important office under the Pennsylvania Railway Company, was offered the position as head of the Department of Property and Supplies, and entered upon his duties January 1, 1888, with the title of Engineer of Property.

Under the supervision of Mr. Watkins the work of bringing up to date the back records of the office was systematically entered upon, and has been vigorously prosecuted; the preparation of a complete list of all articles classed as furniture and fixtures has been begun, and labels and numbers prepared for the same.

FINANCES.

The following statement being supplementary to the detailed report of the Secretary of the Smithsonian Institution, forwarded to Congress December 1, 1888, it has not been thought necessary to repeat the account of expenditures minutely given therein. (See Miscellaneous Document No. 55, Fiftieth Congress, second session.)

During the year ending June 30, 1888, the appropriation received by the Museum for preservation of collections was \$116,000; for furniture and fixtures, \$40,000; for heating and lighting, \$12,000.

PRESERVATION OF COLLECTIONS.

The disbursements paid from the appropriation for preservation of collections for this year are as follows: For services, \$97,493.32 was expended; \$3,427.25 for general supplies; \$8,737.59 for specimens; \$2,281.96 for stationery; \$783.69 for books; \$983.81 for travel; \$2,053.27 for freight and cartage, making a total of \$115,760.89, which leaves an unexpended balance of \$239.11. From this balance there are yet to be paid outstanding liabilities to the amount of \$226.18, principally accounts of bonded railways for freight on specimens, which are still awaiting settlement in the Treasury.

FURNITURE AND FIXTURES.

Out of the appropriation for furniture and fixtures this year there has been expended for services \$19,203.79; for exhibition cases of various designs, with drawings for the same, and for unit-tables and wing-frames, \$7,615.30; for drawers, trays, office furniture and other fixtures, \$2,714.51; for brackets, tools, glass, hardware and interior fittings, \$4,896.08; for lumber, paints, and oils, \$3,080.43; for chemicals, apparatus for laboratory, and for jars and containers for specimens, \$675.81; for oak shields, bird-stands, etc., \$217.94; for linings for cases, \$420.24; for plumbing, tin, lead, slate, tiles, etc., \$1,038.11; and for miscellaneous expenses \$110.83, leaving an unexpended balance of \$26.96.

Detailed list of cases, tables, apparatus, appliances, fittings, etc., made or furnished during the year by persons outside the Museum.

Designs and drawings for cases.....	\$305.00
32 Mahogany, glass screen, upright cases.....	2,080.00
10 Mahogany Kensington cases.....	1,100.00
10 Mahogany Kensington cases (small).....	468.00
1 Mahogany case, special form (for Bison group).....	614.85
1 Mahogany case, special form.....	157.95
12 Ebonized cherry Kensington cases.....	1,140.00
1 Mahogany file case.....	100.00
6 Mahogany half-unit tables.....	360.00

10 Unit-tables, reinforced	\$1,200.00
200 Mahogany wing-frames	86.00
1 Ebonized wing-frame	3.50
Oak shields, bird-stands, etc	217.94
Glass	3,445.16
Lumber	2,323.44
Hardware and interior fittings	1,117.64
Paints and oils	756.99
Drawers, trays, etc	803.26
Office furniture and other fixtures	1,911.25
Plumbing, tin, lead, etc	921.04
Cloth, cotton, felt (lining for cases)	420.24
Chemicals and apparatus	401.32
Glass jars and containers for specimens	274.49
Tools	206.38
Iron brackets	126.90
Slate, tiles, etc	117.07
Miscellaneous articles	110.83

During this year the following cases, articles of furniture, etc., have been made or remodeled in the Museum shop :

Detailed list of cases, furniture, etc., made and remodeled in Museum shop, July 1, 1887, to June 30, 1888.

9 Mahogany door screen cases.	11 Cages for living animals.
1 Mahogany glass screen sloping case.	9 Stands for plants.
1 Mahogany wall case (for minerals).	Shed for buffaloes.
4 Pine cases, special form (built for philosophical instruments).	1 Large frame for picture.
1 Walnut case, special form (around Etruscan tomb).	6 Diaphragms.
1 Oak book-case.	32 Upright cases (for Bird hall, Smithsonian Institution), remodeled.
1 Pine standard book-case.	16 Mahogany, glass screen sloping cases, remodeled.
1 Mahogany basket-stand.	8 Kensington cases, remodeled.
6 Pine pier screens.	2 Walnut wall cases, remodeled.
1 Pine art screen.	2 Walnut table cases, remodeled.
2 Sets of book shelves.	1 Pine book-case, remodeled.
5 Walnut bases.	1 Storage case, remodeled.
2 Pine bases.	

HEATING AND LIGHTING.

The services of engineer, telegraph and telephone clerks, firemen, and mechanics for this year amounted to \$6,053.36 ; there was expended for electrical work and supplies, \$436.50 ; for telephones, \$771.65 ; for rental of call-boxes, \$130 ; for gas, \$950.98 ; for heating supplies and repairs, \$639.73 ; for coal and wood, \$3,014.08 ; a total of \$11,996.30, which leaves an unexpended balance of \$3.70.

CORRESPONDENCE AND REPORTS.

This department of the Museum work has since 1886 been under the charge of Mr. R. I. Geare. The correspondence of the Museum has greatly increased during the last few years. In 1881, the first year of occupancy of the Museum building, the number of pages in the press-

copy books of letters written hardly exceeded one thousand, and of these letters fully one-half related to work connected with the fishery investigations of the Tenth Census.

For the purpose of explaining the nature of the correspondence of the Museum at the present time and of showing the large increase in this branch of the administrative work, it is convenient to arraign the Museum correspondence under the following headings: (1) General Museum business, including matters connected with Museum administration, arrangement of foreign exchanges, etc.; (2) replies to requests for technical information; (3) the acknowledgment of gifts, loans, and exchanges; (4) reports upon specimens sent for identification.

Under the first heading 1,959 letters have been written.

Letters containing requests for information are constantly being received, and it is a part of the duty of this office to see that such requests are referred to the proper specialists, and to incorporate their replies in letters conveying the desired information. During the year 2,626 letters of this kind have been received, and their source is indicated in the following geographical summation:

UNITED STATES.

Alabama	34	Kentucky	39	Ohio	102
Arizona	23	Louisiana	8	Oregon	19
Arkansas	28	Maine	21	Pennsylvania	165
California	55	Maryland	53	Rhode Island	16
Colorado	15	Massachusetts	143	South Carolina	18
Connecticut	46	Michigan	43	Tennessee	50
Dakota	18	Minnesota	13	Texas	51
Delaware	9	Mississippi	8	Utah	8
District of Columbia	494	Missouri	30	Vermont	5
Florida	28	Montana	20	Virginia	84
Georgia	17	Nebraska	14	Washington Terri-	
Idaho	7	Nevada	5	tory	12
Illinois	54	New Hampshire	11	West Virginia	19
Indiana	41	New Jersey	56	Wisconsin	21
Indian Territory	4	New Mexico	21	Wyoming	7
Iowa	41	New York	317		
Kansas	32	North Carolina	39	Total	2,364

FOREIGN COUNTRIES.

Africa	1	Hawaiian Islands	2	Russia	
Argentine Republic	1	Honduras	1	Sandwich Islands	1
Austria	1	Hungary	2	Scotland	10
Bering Island	2	India	2	Sweden	2
Brazil	12	Ireland	5	Switzerland	2
Canada	29	Italy	4	Tasmania	2
China	2	Japan	14	United States of Co-	
Denmark	5	Korea	2	lombia	6
Dutch Guiana	1	Mexico	22	Uruguay	3
Egypt	2	Newfoundland	1	West Indies	12
England	44	New Zealand	7		
France	43	Norway	3	Total	262
Germany	13	Nova Scotia	2		

More than a thousand acknowledgments of specimens acquired by gift, loan, and exchange have been written.

The number of "lots" of specimens received for examination and report during the year was three hundred and fifty-seven, fourteen of which were transmitted by Members of Congress. This material included birds, insects, minerals, ores, rocks, fossils, ethnological and archaeological objects, shells, fishes, mammals, plants, oils, earths, reptiles, birds' eggs and nests, skeletons, fibers, coins, marine invertebrates, fossil wood. The specimens were submitted to the Museum curators, and a report embodying the opinion of the curator has been prepared in every instance for the signature of the Assistant Secretary and for transmission to the sender.

By far the larger proportion of the material sent for examination is of very little value to the Museum collections, although occasionally a specimen is retained for addition to the exhibition or study series. The Museum reserves the right, except when special agreement to the contrary is made, to keep all material sent for examination and report.

Thirty-one lots of specimens were borrowed by curators to aid them in the identification of Museum material. These included twenty-two collections of bird-skins, seven of shells, and three of fossils. The courtesy of the lending was acknowledged by formal letters.

During the year 5,272 pages of press copy-books have been filled with letters relating exclusively to Museum matters.

This office is also charged with the compilation of data for the annual report, with the preparation of a bibliography of the Museum publications and of papers published by Museum officers and other collaborators, and also with the preparation of the list of accessions to the Museum, accompanied by indexes showing (1) the Museum department to which referred, and (2) the geographical source of the accession.

PREPARATION OF LABELS.

During the year 2,159 forms of labels have been printed, as is shown in the following statement:

Department of Birds	1,100
Section of Coins and Medals.....	431
Department of Metallurgy.....	273
Section of Materia Medica	164
Department of Ethnology	191
Total.....	2,159

More than two thousand additional labels were sent to the Government Printing Office during the year. These, however, had not been received at the close of the fiscal year.

Since the instructive value of objects exhibited depends in great part on good descriptive labels, it is hoped that hereafter greater facilities may be afforded for the rapid printing of the same.

THE WORK OF THE MUSEUM PREPARATORS.

The preparation of specimens for exhibition in the Museum, or for the study series, has been satisfactorily continued. The work of modeling has been placed under the charge of Mr. W. T. Hornaday, chief taxidermist.

(a) TAXIDERMISTS AND MODELERS.

The work of this department has been unusually important. Early in the year the making of large casts was discontinued, and Mr. Joseph Palmer, modeler, was added to the force of mammal taxidermists. A little later Mr. William Palmer was also assigned to this department, and has accomplished some excellent results in the preparation of small mammals. Mr. Joseph Palmer has rendered valuable service in the mounting of large mammals. In order to complete the systematic administration of this class of work Mr. J. W. Hendley was also added to this force, which thus becomes the Department of Taxidermy and Modeling, under the direction of Mr. W. T. Hornaday, chief taxidermist. This force also includes Mr. A. H. Forney and Mr. George F. Pollock, an unsalaried assistant serving for instruction in taxidermy. During the last month of the year, Messrs. George K. Cherrie and B. W. Mitchell were engaged temporarily to assist in the preparation of the exhibit for the Cincinnati Exposition.

TAXIDERMY PROPER.

The event of the year has been the mounting of a series of six of the buffaloes obtained by the Smithsonian Expedition sent out in 1886, and the arrangement of the specimens in a group. The finished group is fitly regarded as a monument to the American bison, and illustrates not only the various stages of growth of the animal from the young calf to a huge old bull of enormous proportions, but the ground-work and natural accessories of the group have also been carefully and artistically worked up to illustrate the habitat of the animal. The whole is regarded as a triumph of the taxidermist's art, and, so far as known, it surpasses in scientific accuracy, and artistic design and treatment, anything of the kind yet produced. The group is the work of Mr. Hornaday, assisted by Mr. Joseph Palmer and Mr. A. H. Forney. The case containing the group is also regarded as a model of its kind, both in elegance of design, and perfect adaptability to its purpose. Its dimensions are as follows: Length 16 feet, width 12 feet, height 10 feet.

The preparation of the group of buffaloes fairly inaugurates a line of work which has been in contemplation for some time, namely, the preparation of a series of artistic groups of American mammals, both large and small, each in its own special case, with natural accessories representing its favorite habitat. The taxidermists have also mounted during the year a group of prong-horn antelopes, of coyotes, prairie-dogs, opossums, gray squirrels and red squirrels, and have also made a beginning on a group of moose and two groups of foxes. The groups of

coyotes, antelopes, prairie-dogs, and opossums were placed on exhibition shortly after the completion of the group of buffaloes, which occurred on March 10, 1888.

The following is a list of the mammals which have been mounted during the year :

Groups of mammals.

American bison* (<i>Bison americanus</i>) :	Coyotes* (<i>Canis latrans</i>) :
15703. Adult bull.	15707. Adult male.
15697. Adult cow.	15708. Adult female.
5686. Young cow.	15491. Young.
5685. Young bull.	Prarie dogs (<i>Cynomys ludovicianus</i>) :
15694. Yearling calf.	16071. Adult male.
15503. Young calf.	14635. Adult female.
Prong-horned antelopes (<i>Antilocapra americana</i> † :	14636. Adult male.
15714. Adult male.	14637. Adult female.
15713. Adult female.	One burrowing owl.
13305. Young male (repaired).	Northern Gray Squirrels (<i>Sciurus carolinensis</i>) :
15962. Young kid.	3 adult specimens.
15963. Young kid.	3 young.
Opossums (<i>Didelphys virginiana</i>) :	Red squirrels (<i>Sciurus hudsonius</i>) :
2 adult specimens.	2 adult specimens.
2 young.	4 young.
4 old specimens repaired.	

Miscellaneous mammals mounted.

- 15215. Horse Antelope (*Hippotragus equinus*.)
- 16110. Oryx (*Oryx capensis*), head.
- 16140. Red Fox (*Vulpes fulvus*), young.
- 16141. Red Fox (*Vulpes fulvus*), young.
- 16142. Red Fox (*Vulpes fulvus*), young.
- 16162. Gray Fox (*Urocyon virginianus*), young.
- 16163. Gray Fox (*Urocyon virginianus*), young.
- 14630. Esquimo Dog (*Canis familiaris*).
- 16172. Meer-kat (*Cynictis leptura*).
- 15620. African Porcupine (*Hystrix cristata*).
- 13666. Indian Jerboa Rat (*Gerbillus indicus*).
- 2230. Loir (*Myoxus glis*).
- 2494. Franklin's Spermophile (*Spermophilus franklini*).
- 15446. Californian Spermophile (*Spermophilus grammurus*).
- 16189. Common Mouse (*Mus musculus*).
- 16014. White-footed Mouse (*Hesperomys leucopus*).
- 11120. Jumping Mouse (*Zapus hudsonius*).
- 15641. Pocket Gopher (*Geomys bursarius*).
- 2261. Star-nosed Mole (*Condylura cristata*).
- 7261. Common Mole (*Scalops aquaticus*).
- 2164. Shrew (*Blarina talpoides*).
- 16188. Mole Rat (*Bathyergus maritimus*).

* The first stage of work on this group was accomplished during the latter half of the last fiscal year, but the completion of the mounting and the entire work of grouping is to be credited in the report of the present year,

† Temporarily arranged in a temporary case,

DRY SKINS.

A special feature of taxidermic work during the past year has been the overhauling of the collection of wet skins and the making up of a great many of the duplicates as dry skins suitable for study. The entire force spent about two months in work of this kind, and prepared dry skins as follows:

Primates—Chiefly monkeys from Honduras.....	13
Chiroptera.....	2
Carnivora—Bears, lynxes, wolves, weasels, etc.....	21
Rodents—Porcupines, squirrels, rabbits, agoutis, pacas, etc.....	22
Ungulates—Deer, chiefly tropical species.....	7
Edentates—Armadillos and sloths.....	6
Marsupials.....	1
Total.....	72

The chief taxidermist was occupied during the entire month of June in preparing a special exhibit for the Cincinnati Exposition.

The taxidermists in the Department of Birds during the year performed the following work:

Birds mounted.....	376
Birds skinned.....	122
Mounted birds made into skins.....	955
Mounted birds transferred to new stands.....	1733
New stands put together.....	1107
Skins poisoned.....	20
Large mounted birds repaired.....	5

Specimens in the flesh collected and received.

Number of mammals skinned and prepared.....	56
Number collected by the taxidermists.....	44

MISCELLANEOUS WORK.

An unusual quantity of miscellaneous work has required attention, which tended to lessen the amount of visible results for the year. The following are a few of the principal tasks completed:

- 43 mammal skins, heads and skulls were poisoned.
- 17 mammal heads repaired after return from the Cincinnati Exposition.
- 8 pairs antlers cleaned and retouched.
- 7 pairs antlers mounted on shields and hung up.
- 25 large mammals cleaned and retouched.
- 24 small mammals cleaned and retouched.
- 14 mounted mammals were repaired and retouched.
- 11 large wet skins picked out for exchange.
- 1 large mounted mammal was dismantled.
- 16 barrels of solution were made for wet skin collection.
- 38 barrels and three tanks of wet skins were moved to laboratory.
- 28 boxes of specimens were received.
- 14 miscellaneous boxes of specimens were packed and shipped.
- 41 boxes mounted mammals were packed for Cincinnati Exposition.
- 9 large cages for living bears, birds of prey, etc., were built by the taxidermists.

From November 8, 1887, to February 1, 1888, the collection of living animals was cared for by the taxidermists.

Mr. Joseph Palmer made a trip to North Platte, Nebraska, and brought back two living buffaloes,

Mr. W. T. Hornaday, the chief taxidermist, was absent one month on a collecting trip to the Pacific coast.

Mr. Joseph Palmer devoted the entire month of June to making casts for the Department of Ethnology.

MODELING AND PAINTING.

Mr. J. W. Hendley has accomplished much valuable work, making painted casts of the specimens constituting the extensive and almost priceless collection of Babylonian and Assyrian seals owned by Mr. R. S. Williams, of Utica, New York. No more important work has engaged Mr. Hendley's attention during his connection with the National Museum, and it is due him to say that notwithstanding the many difficulties attending the casting and painting of agate, chalcedony, onyx, graphite, and crystal seals covered with delicate inscriptions, he has reproduced them all with a degree of skill and fidelity which, it is believed, has never before been attained. In many instances the copies were so exact in color, surface, similarity of substance and weight, that even the owner of the seals several times mistook the copies for the originals. Not only were the seals themselves copied, three complete sets being made, but Mr. Hendley also made a flat impression in black and white of the inscription on each of the cylindrical seals, so that the characters may be studied to the best possible advantage. Of these flat impressions four complete sets were made.

Mr. Hendley has also made thirty-three casts of meteorites for the Department of Minerals, to be used in exchanges.

The more important items of work accomplished by Mr. Hendley during the year may be summarized as follows:

- 29 Babylonian and Assyrian seals cast and painted, three complete sets, or 87 copies in all.
- 29 flat impressions of seals made in black and white, four complete sets, or 116 pieces in all.
- 11 casts of Arkansas iron meteorite.
- 11 casts of North Carolina stone meteorite.
- 11 casts of Mexican iron meteorite.
- Bartholdi's statue of Roman Soldier repaired and painted.
- Busts of Professor Baird and Robert Fulton painted.
- Statue of General McPherson repaired and painted.
- Siamese coat of arms repaired and regilded.
- Large Japanese plaque repaired and pieces restored.
- Large heraldic shield repaired and regilded.
- 3 sets of casts made of the phosphorus, potassium, and sodium for the collection illustrating the composition of the human body.
- 1 set of casts made to represent the daily food of a man—bread, butter, potatoes, and beefsteak.
- 2 Ute Indian lay figures made, costumed, and grouped.
- 3 medals copied.

Notwithstanding the value of Mr. Joseph Palmer's taxidermic work, it has been found necessary to interrupt it from time to time in favor of important work in plaster. During the year he has put together and set up the original plaster model of Crawford's statue of Washington,

repaired two Mexican idols, made a cast of the head of a large moose (in the flesh), and repaired a large group of serpents cast from nature. During the month of June Mr. Palmer took molds of the celebrated Canopus inscriptions, of a large Assyrian obelisk, and two large sculptured slabs in the Episcopal Seminary of Fairfax County, Virginia, at Alexandria.

(b) OSTEOLOGICAL PREPARATOR.

The work of preparing and arranging osteological material has been greatly interrupted during the past year.

During the months of July and August Mr. Lucas was absent on a collecting trip to Newfoundland and Labrador, while Mr. Scollick, the only assistant, was for seven weeks unable to do any work on account of sickness.

In November the work-rooms were transferred from the Armory to the Laboratory building, together with a considerable amount of material on storage at the former place.

The re-arrangement of the Museum halls necessitated a complete change in the disposition of the cases containing the exhibition series of skeletons, while the growth of the collections rendered it necessary to completely change the arrangement of the study series of birds.

Finally, the month of June was largely devoted to packing specimens for the Cincinnati Exposition.

During the year the collection of alcoholic birds was transferred from the basement of the Smithsonian to the Laboratory building, and while some little work has been done in the way of arranging and caring for them, a great deal of labor will be required to place this valuable collection in thoroughly good order.

Considerable time was spent in assorting the large and valuable collection of bones of the extinct great Auk, secured by the *Grampus* expedition, and besides a mounted skeleton, other preparations have been made relating to the history of this interesting bird.

The following table gives a summary of the material received and of the work of preparation accomplished during the year :

	Received fresh.	Cleaned.	Mounted.	Total.
Mammals:				
Skulls.....		114	2	116
Skeletons.....	9	21	8	38
Portions of skeletons.....		2	1	3
Birds:				
Skulls.....		3		3
Skeletons.....	30	26	5	61
Portions of skeletons.....	2	5	4	11
Reptiles and batrachians:				
Skeletons.....	1	3	5	9
Fishes:				
Skeletons.....		10		10
Total.....	42	184	25	251

(c) PHOTOGRAPHER.

Mr. T. W. Smillie reports that 567 negatives have been added to the permanent files, as shown in the following statement: ethnological, 9; mineralogical, 17; lithological, 21; archæological, 150; historical, 16; osteological, 6; mammals, 76; transportation, 30; Fish Commission, 16; miscellaneous, 181.

Two thousand five hundred and sixty-five prints have also been made: ethnological, 175; mineralogical, 74; lithological, 26; archæological, 226; historical, 170; osteological, 10; mammals, 77; transportation, 34; miscellaneous, 1,228; cyanotypes, 106; enlargements, 33; collection of miscellaneous photographs mounted, 270.

Work for the U. S. Fish Commission: negatives, 61; silver, albumen, and plain prints, 545; cyanotypes, 218; enlargements, 16.

The usual routine work of numbering and filing negatives, making up outfits for expeditions, etc., has been continued.

The illustrating of several of the lectures given in the National Museum has been conducted by means of the stereopticon operated by the photographer and his assistants.

(d) COLORIST.

Mr. A. Zeno Shindler has accomplished during the year the work here specified: Painting cast of two copperhead snakes; repairing and painting a portrait of St. Domingo, making a colored sketch of a Quin-nat salmon, making a colored sketch of a rattlesnake, making a colored sketch of a large lizard (British Guiana), painting the cast of the same, water-color painting of a Pimo Indian, weaving; repairing forty fish casts for the Minneapolis Exhibition.

In the Department of Ethnology: Painting three casts of Mound-builders' pipes, repairing cast of a Sioux woman, painting seven busts of Moqui Indians, copies of three Japanese paintings on silk, painting four casts of tablets of ancient sculpture, repairing and repainting nine Mexican idols, painting life-size bust of a Zuñi Indian, three crayon drawings of the Behistom Sculptured Rock, 6 feet by 3 feet; eighty-five Indian photographs colored, making colored sketches of Pacific Ocean invertebrates, repairing two shells, constructing and painting five maps of prehistoric France, four oil paintings of Funk Island, two water-colors of the Great Auk and eggs.

The painting, repairing, and repainting of a considerable number of miscellaneous objects has been also attended to.

(e) PREPARATOR IN THE DEPARTMENT OF ARTS AND INDUSTRIES.

Mr. E. H. Hawley has devoted the greater portion of his time to the preparation of material for exhibition. Among the more important collections which he has installed during the year, were the Hippiusley collection of Chinese pottery; the Grant relics; a collection of Japanese

pottery; the Wilson collection of ancient pottery, and a collection of laces. He has also re-arranged the Capron collection, mounted and framed a collection of prints, arranged the collection of Siamese ware, assisted in arranging the collection of Graphic Arts, and also the collection illustrating transportation. In addition he has re-arranged the Japanese bronzes and French pottery, and has superintended the preparatory work on some special exhibits for the Cincinnati Exposition.

H.—GEOGRAPHICAL REVIEW OF THE MORE IMPORTANT ACCESSIONS.

The total number of accessions to the Museum during the year was 1,481.

The alphabetical index of all accessions to the Museum received up to January 1, 1887, has been brought down to date by S. C. Brown, registrar. This forms an excellent means of reference.

The number of packages received containing material sent for examination and report, and specimens borrowed by the curators for use in comparison, 265.

In the list of accessions every specimen received for examination is so entered, although for convenience this material has been incorporated with the general list of accessions proper.

During the year material has been received from every region of the globe, although the bulk of the accessions has come from various parts of the United States.

The following statement includes the more important accessions, arranged according to the localities whence they came.

AFRICA.

Kassai River.—Lieut. E. H. Tann, U. S. Navy, made a collection of ethnological objects, which were of considerable interest and value.

Egypt.—A collection of fossil woods was given by W. T. Hornaday. This collection is specially valuable for the reason that very few similar collections have before been made.

Dr. James Grant-Bey sent a collection of ethnological objects and some very interesting relics, including scarabs, statuettes, gold seals, etc.

Madagascar.—Edward Bartlett, Chillington House, Maidstone, Kent, England, sent a collection of birds' nests and eggs, and three reptiles.

South Africa.—The Albany Museum, Grahamstown, Cape Colony, sent a collection of shells, in return for material received from the National Museum.

AMERICA.

BRITISH AMERICA.

British Columbia.—A collection of ethnological objects, made by Dr. Franz Boas, was presented by him to the Museum.

Canada.—Ernest E. Thompson sent two collections of birds, one numbering thirteen specimens, and the other twenty-two.

CENTRAL AMERICA.

Costa Rica.—A very valuable collection of Coleoptera was received from T. D. Godman and O. Salvin.

Señor José C. Zeledon sent three collections of bird skins, birds' eggs, and stone implements.

G. Flemming sent a collection of Indian arrows.

Sereno Watson sent a collection of Costa Rica ferns.

Honduras.—Charles H. Townsend, of the U. S. Fish Commission, sent from this place a collection of ethnological objects, fishes, plants, reptiles, birds' nests, bird skeletons, insects, and a collection of three hundred and twenty-five bird skins.

DANISH AMERICA.

Greenland.—Mrs. Mildred McLean Hazen sent three Eskimo kyaks.

MEXICO.

A very valuable collection of botanical specimens, including many species new to science, was received from C. G. Pringle.

Edward Palmer made a collection of birds, rocks, stone implements and ethnological objects, which were purchased by the Museum.

Messrs. G. B. and W. B. Hyde gave to the Museum two stone images, a spindle, and a loom obtained in Puebla.

A collection of land and fresh water shells, numbering thirteen specimens, was received from R. W. Bastow.

William Brewster sent a collection of Mexican birds.

A collection of Mexican zoological and botanical specimens was received from Señor José N. Roviroa.

Ward Batchelor sent stone idols obtained by him in Mexico.

Prof. A. Dugès sent for determination a very large collection of Mexican mammals, bird skins, reptiles, shells, insects, corals, plants, fishes, crustaceans, etc.

UNITED STATES.

Alabama.—C. L. Stratton sent a collection of stone implements.

I. C. Russell, of the U. S. Geological Survey, sent a collection of thirty species of fossil plants, a few of which are new to science.

T. H. Aldrich sent a collection of fossils.

Alaska.—A collection of the fossil plants of this region was received from H. L. Aldrich.

Mrs. George M. Robeson gave a collection of arrows and arrow-heads.

A collection of ethnological objects was received from Mrs. Mildred McLean Hazen.

Through the courtesy of Hon. Peter Bonnett, Chief of the U. S. Revenue Marine, and Capt. M. A. Healy, of the U. S. Revenue Marine steamer *Bear*, the Museum was enabled to add to its collections of boats six birdarkas, used by Alaskan natives.

Nichols Grebnitzky sent a collection of shells, fishes, worms, crustacea, sponges, and echini; also a whale, and skeleton of whale, *Ziphius grebnitzkii*.

Arizona.—Herbert Brown sent a collection of birds' eggs.

Lieut. W. L. Carpenter, U. S. Army, sent a collection of mammals, eggs, stone implements, fish, birds, reptiles, among the latter a Gila monster.

Lieut. H. C. Benson, U. S. Army, sent a valuable and interesting collection of birds, and birds' nests and eggs, and reptiles.

Arkansas.—A collection of fifty-two stone implements was received from the Davenport Academy of Natural Science.

J. G. Wallis sent a collection of rocks from this State.

California.—Dr. R. E. C. Stearns sent a large collection of shells; and another collection of shells, ores, rocks, fossils, minerals, etc.

D. W. Coquillett sent one hundred and thirty-three specimens, representing thirty-six species of Diptera.

Edward Palmer sent a collection of birds' eggs, stone implements, materia medica, and a series of plants representing seven hundred and sixty-eight species.

A collection of birds numbering ninety-four specimens, representing twenty-three species, was sent by William Brewster.

F. Stephens sent a collection of mammal skins and birds' eggs.

From the California State Mining Bureau was received a collection of specimens of colmonite.

G. P. Merrill gave three boulders of glaucophane rock.

Colorado.—A collection of ores and rocks gathered by S. F. Emmons, of the U. S. Geological Survey, was received.

Messrs. Taylor and Brunton, of Leadville, sent a collection of sulphide ores.

A collection of mosses, trout, insects, shells, and mammals was sent by Theodore D. A. Cockerell.

From Denis Galé was received a collection of birds' skins and a collection of birds' eggs, which is of great value, as it contains some very rare species.

C. E. Aiken sent a collection of birds.

Connecticut.—A very large collection of Diptera was received from Dr. S. W. Williston. This collection includes two hundred and sixty-three species, seven hundred and twenty-nine specimens of *Syrphidae*, which are types of Bull. U. S. National Museum, No. 31. The collection is the most complete and the best of the family extant.

G. L. Faucher sent five arrow-heads.

A collection of Lepidoptera was received from A. F. Wooster.

The Museum of Wesleyan University contributes a collection of shells, selected by William H. Dall.

A collection of birds' eggs and nests was received from John N. Clark.

A collection of minerals was received from E. H. Olmsted.

Dakota.—H. M. Creel presented a collection of ethnological objects obtained from the Indians in this Territory.

District of Columbia.—The following collections of birds and birds' nests were received: Dr. A. K. Fisher sent eleven nests and eighty-five eggs. H. M. Smith sent a small collection of skins, as did W. T. Roberts. Dr. W. H. Fox sent eight species of birds, and a collection of seventy-six nests and nine hundred and fifty eggs was given by C. W. Richmond. Mrs. M. H. Webster gave a cuckatoo parquet.

S. V. Proudfit sent a collection of one hundred and thirty arrow and spear heads.

E. R. Reynolds gave a collection of two hundred and fifty-nine stone implements, and a collection of similar objects was presented by E. P. Upham.

Two collections of Lepidoptera were given, one by J. S. Tyree, and the other H. F. Shoenborn.

Florida.—Joseph Willcox sent a collection of shells.

E. H. Schwarz sent a collection of Orthoptera and Hymenoptera.

W. O. Crosby sent a collection of minerals.

A collection of Coleoptera was sent by R. A. Mills.

Berlin H. Wright sent a collection of Unionidæ containing types of new species.

Georgia.—L. M. Underwood sent a collection of Arachnida and Myriapoda.

A collection of plants, numbering one hundred and twenty-five species, was purchased from Gerald McCarthy.

Idaho.—Two collections were received from this State, one consisting of a quiver, two bows, and five arrows of the Cœur d'Alene Indians, sent by Lieut. H. T. Allen, U. S. Army; the other, a small collection of living animals and elk antlers, collected by Wm. T. Hornaday.

Illinois.—A collection of sixty stone implements including flakes, scrapers, etc., was received from W. H. Adams.

A. Bridgman, jr., sent a valuable swan's skin.

Indiana.—H. W. Hanna sent a collection of stone implements.

Charles S. Beachler sent eight reptiles and twenty-two fossils.

A large collection of stone implements was sent by John H. Lemon, who also sent a collection of spiders.

An interesting ceremonial weapon was sent by W. H. Dodge.

Mrs. Sarah C. McCormick sent a lot of spear and arrow heads.

The Indiana State University sent a collection of Silurian, Devonian, and Carboniferous shells of great value. This collection includes types of twenty-two species described by Dr. David Dale Owen, in his report on the Geology of Wisconsin, Indiana, and Iowa.

Indian Territory.—W. T. Van Doren sent a head dress, pair of leggins, concretion, and a lot of minerals.

Charles T. Simpson sent a collection of land and fresh water shells.

Iowa.—Dr. F. H. Steinhilber sent a collection of stone implements.

R. Ellsworth Call sent a collection of reptiles and fishes.

J. F. Kummerfield sent a collection of stone implements.

Kansas.—A collection of flint chips and fragments of stone implements was received from Dr. W. S. Newlon, who also sent a collection of stone and shell implements numbering eighty-seven specimens.

Mr. W. S. Hill sent a very large collection of stone implements.

Kentucky.—The three principal collections received from this State were the following: Birdskins, from C. W. Beckham; shells, Mrs. Sarah C. McCormick; stone implements, fossils, and skull, W. R. Burns.

Louisiana.—Two small collections of Lepidoptera were received, the one being sent by Rev. T. W. Smith, and the other by W. A. Sandos.

Maine.—C. M. Sawyer sent a collection of sixteen stone implements; also polished spear-heads and two quartz scrapers.

James E. Knowlton sent a collection of seventeen stone implements.

G. P. Merrill collected a large number of rock specimens.

Maryland.—Among the objects received from this State was a collection of stone implements given by W. H. Abbott; a collection of birds sent by Henry Marshall; a collection of fossils in eocene marl, received from Lieut. T. Dix Bolles, U. S. Navy; birds sent by George Marshall; a collection of rocks from W. H. Hobbs; and a lot of arrow-heads given by Mary Eliza Jefferson.

Massachusetts.—Great quantities of material are annually received from the U. S. Fish Commission Station at Wood's Holl. During the past year the material received from this source consisted of fishes, birds, marine invertebrates, insects, mollusks, etc.

Willard Nye, jr., sent a collection of ten paleolithic implements.

George P. Merrill collected for the Museum a series of rocks of Massachusetts.

From the Peabody Academy of Science was received a small collection of paleolithic stone implements.

Michigan.—William Palmer, of the U. S. National Museum, presented four birds from this State.

F. E. Wood sent a very valuable collection of plants.

Mississippi.—A collection of fossils was received from L. C. Johnson, and a collection of ethnological objects from Dr. W. A. Whitten.

Missouri.—R. Ellsworth Call sent a very fine crinoid column and a collection of worms and crustaceans; a collection of twenty-seven stone implements, ten of which were paleolithic, was received from Marion Crawford.

Montana.—James Forrestell sent a collection of rocks.

From Dr. A. C. Peale, of the U. S. Geological Survey, were received two specimens of wood opal.

A collection of ethnological objects was received from Messrs. J. I. and T. C. Allen.

From E. C. Babcock was received a very fine white goat-skin.

Nevada.—A collection of ores was received from W. D. Maynard, and a collection of rocks from E. H. Spooner.

New Hampshire.—The material received from this State was mainly ornithological, the two principal accessions being a collection of birds' eggs from Charles F. Morrison, and a collection of sixty-five birds from W. H. Fox.

New Jersey.—Dr. C. Hart Merriam, of the Department of Agriculture, sent a bird.

Theodore Harris sent fishes.

A collection of rocks from this State was received from the U. S. Geological Survey.

W. E. Hidden sent four crystals of black tourmaline.

Thomas Wilson gave a collection of stone implements.

R. E. C. Stearns gave some fossil brachiopods.

Dr. T. H. Bean spent a part of the summer at Somers Point in the interest of the U. S. Fish Commission and incidentally accumulated a large collection of birds, crabs, and fishes, which, through the courtesy of the U. S. Commissioner of Fisheries, was transferred to the National Museum.

New Mexico.—Dr. O. Lincoln sent ten specimens of vanadinite.

Dr. R. W. Shufeldt, U. S. Army, sent a valuable collection of mammals.

Dr. Washington Matthews, U. S. Army, sent dressed buckskin, bone used as a tool, and seven photographs showing process of tanning by the Navajo Indians.

New York.—Dr. B. D. Skinner sent some stone implements, including stone sinkers, arrow and spear heads, water-worn pebbles, fragments of pottery, etc.

From the U. S. Military Academy was received a curious necklace made of human fingers.

From A. G. Richmond was received a large collection of stone implements, numbering three hundred and ninety-six specimens.

A collection of fossils and rocks gathered in New York was sent to the Museum by the U. S. Geological Survey.

Dr. J. C. Merrill, U. S. Army, sent a collection of mammals.

R. Fritsch sent specimens of alabaster.

From George N. Lawrence was received a collection of birds' eggs.

A. A. Duly gave to the Museum a collection of rocks.

From Col. A. G. Tassin, U. S. Army, were received several collections of birds killed by flying against the electric light on the Liberty Statue in New York Harbor.

From L. J. Bennett was received a collection of fossil crustacea, containing many beautiful specimens.

M. K. Barnum sent birds.

Specimens of Hymenoptera were sent by Joseph McAllister.

L. M. Underwood presented a collection of insects.

From Dr. G. F. I. Colburn were received some very interesting relics from the battle-field of Ticonderoga.

North Carolina.—A collection of plants was received from Gerald McCarthy.

A collection of rocks was sent by T. C. Harris.

Specimens of black granite were received from P. Linehan & Co.

A collection of ores was received from W. A. H. Shreiber.

Howard Haywood sent a collection of stone implements, including spear-heads, celts, knives, leaf-shaped implements, tools, quartz crystals.

J. A. D. Stevenson sent a collection of stone implements.

Willard Nye, jr., sent a collection of fifty-three stone implements.

Ohio.—The material received from this State consisted principally of stone implements. Three collections were sent by J. W. Tweed, a collection of fifty-seven specimens by C. T. Wiltheiss, and smaller collections by R. W. Mercer, T. B. Bowers, James C. White, Lafayette Faris, Howard Bell, and D. T. D. Dyche.

An interesting and valuable collection of fossil plants containing some new species was received from H. Herzer.

Oregon.—Several very valuable collections were received from Dr. J. C. Merrill, U. S. Army. These collections included crayfishes, insects, fishes, reptiles, mammals, land and fresh water shells, and a very valuable collection of birds' eggs and nests.

C. K. Smith sent two collections of stone implements, one numbering thirty-three specimens and the other seventeen specimens.

Pennsylvania.—Two collections of minerals were received, the one a series of twenty-eight specimens, sent by William J. Mullins, and the other a collection of cut stones, sent by James W. Beath.

Three collections of stone implements were received, one of which included three hundred and fifty-five specimens; the two other collections received were from C. P. Emmons and Howard B. Davis.

Rhode Island.—The contributors of material from this State were W. O. Crosby, who sent a collection of minerals, Capt. H. M. Knowles, who sent a collection of fishes, M. A. Keach, who gave some shells, and Joseph Church & Co., who sent a collection of fish and clams.

South Carolina.—E. E. Jackson sent an Indian pipe.

A collection, including ninety specimens, of spear-heads, arrow-heads, and a discoidal stone, was received from Joseph Ward.

Tennessee.—A large amount of material was received during the year from Dr. J. C. McCormick, and subsequently from his widow, Mrs. Sarah C. McCormick. The collection sent by them included human bones and pottery from Tennessee mounds, plants, birds, fish, skeletons of horse, deer, gray fox, and man, and a collection of fossils, Upper Silurian, Devonian, and Carboniferous.

James M. Null sent a collection of stone implements, numbering two hundred and seventy-one specimens.

Dr. J. M. Drake sent a collection of stone implements.

E. W. Mort sent specimens of ore.

Texas.—A collection of meteoric stones was received from Messrs. Ward and Howell, of Rochester, New York.

J. A. Singley sent a collection of fresh-water shells.

C. W. Beckham sent a large collection of birds, including fifteen species and numbering two hundred and nineteen specimens.

G. B. Benners sent birds.

Utah.—Dr. C. W. Higgins sent several living mammals, among which were a spotted lynx, a red fox, a badger, and a golden eagle.

Vermont.—G. H. Perkins sent a collection of forty-six stone implements.

A collection of rocks, ores, fossils, stone implements, and plants was received from F. H. Knowlton.

Virginia.—Robert Ridgway sent several collections of birds, nests, and eggs.

L. M. Underwood sent a collection of insects.

A collection of pottery was sent by William Palmer.

J. M. Whitside presented a collection of Coleoptera and Hymenoptera. Dr. A. S. Payne sent a collection of stone implements, marbles, and ores.

Several single specimens were received, amongst which are a white eagle from Willie Taylor, a specimen of ore from A. Wise, and a rainbow trout presented by the U. S. Fish Commission.

Washington.—A new species of a new genus of a fish, *Acrotus willoughbii*, was sent by Charles Willoughby.

A collection of ethnological specimens was sent by Mrs. Anna C. McBean.

James G. Swan sent a carved totem post and two models of Indian lodges.

West Virginia.—Prof. I. C. White sent a collection of Orthoptera.

Wisconsin.—From J. E. Gere was received a collection of stone implements, including plates, scrapers, cutting tools, perforator, spear-heads, pierced tablet, leaf-shaped implements; also fossils.

A collection of mosses and lichens was presented by J. H. Schuette.

H. Beach sent a collection of stone implements.

Wyoming.—A collection of birds' eggs was sent by Charles F. Morrison.

WEST INDIES.

C. B. Cory sent a collection of reptiles obtained from these islands. W. T. Hornaday sent a collection of fossil woods, which is specially interesting and valuable, as this region has been rarely visited by collectors of such material.

Cuba.—Louis Schmid & Son sent a parrot.

SOUTH AMERICA.

Chili.—Señor José Smith Solar sent a Chilian coin, and a hat of the type worn by the gentlemen of Chili.

Diamantina, Lower Amazon.—A collection of bird skins from this region was presented by C. B. Riker.

Salvador.—J. Fleming sent a collection of pottery.

United States of Colombia.—A collection of Chiriqui pottery was received from J. A. McNiel.

H. K. Coale sent a collection of birds' skins obtained in various parts of South America.

ASIA.

Asia Minor.—Otto Goldfuss sent a collection of shells from this region.

China.—P. L. Jouy, of the National Museum, contributes a collection of forty-nine bird skins and another collection of birds, numbering nineteen specimens and representing fourteen species. These collections were made by himself while in China.

Mr. Oliver B. Adair sent a collection of coins.

Corea.—From P. L. Jouy was obtained a collection containing the following objects: Bird skeletons, ax, roadside sign-post, mortuary pottery consisting of earthen pots, vases, bowls, jars, cups, bottles, flower stand, and also a collection of Corean medicine.

India.—H. K. Coale sent a collection of bird skins.

Japan.—Among the foreign institutions with which the Museum carries on exchange of material is the Department of Education, Tokyo, Japan. From this source has been received a collection of meteoric stones containing iron, and anorthite crystals from a lava stream during an eruption in 1874, and sapphire crystals and tin washings; also four blocks of lacquer work. A large collection of bird skins was also received.

Lieut. T. Dix Bolles, U. S. Navy, presented three Japanese swords, ivory carving, writing-case and material, collected by himself in Japan.

EUROPE.

England.—The following collections were received: F. H. Butler, of London, sent a collection of minerals; Edward Lovett sent fifty-one stone implements; J. W. Clark sent bones of extinct tortoises and Didine birds; Robert Hadfield sent a collection of manganese steel; R. N. Worth, curator of the Plymouth Museum, sent a collection of rocks in exchange for Museum material.

France.—A large collection of casts of heads of individuals of the different human races was received from the Musée d'Histoire Naturelle in Paris.

Germany.—Dr. J. W. Eckfeldt sent a collection of mosses and lichens.

Greece.—Otto Goldfuss sent a collection of land and fresh water shells.

Norway.—From the Stavanger Museum were received twenty birds skins.

Russia.—J. Von Siemaschko, St. Petersburg, Russia, sent two pieces of meteoric stone.

Specimens of copper ore were received from G. W. Maynard.

A collection of plants, obtained at Spitzbergen by Dr. Emil Bessels, was presented by him to the Museum.

The late Dr. Charles Rau bequeathed to the National Museum a large collection of European stone implements, numbering four hundred and seventy-four specimens.

Wales.—T. A. Redman sent a specimen of gold in quartz.

OCEANICA.

AUSTRALASIA.

Australia.—A collection of ores, minerals, and rocks was received from the Australian Museum.

Edward Bartlett sent a collection of ethnological objects, land shells, and a series of Coleoptera, which is the first representation in the Museum of Australian insect life.

New Zealand.—From S. H. Drew, of Wanganui, was received a collection of fossil shells, in exchange.

Tasmania.—A collection of one hundred and thirty-six specimens of wool from Tasmania, New South Wales, and Queensland was received from the Technological Museum.

MALAYSIA.

The Zoological Society of Philadelphia presented a monkey received from Java.

POLYNESIA.

Easter Island.—Paymaster William J. Thomson, U. S. Navy, deposited a valuable collection of ethnological objects, including spear-heads, paddles, oars, clubs, skull, tapa cloth, head-dress, idols, and stone implements, together with photographs of the island and of various objects used by the natives; obtained by him while attached to the U. S. S. *Mohican*.

Hawaiian Islands.—The Queen of Hawaii, through Hon. H. A. P. Carter, minister for Hawaii at Washington, presented a canoe of the kind used by the natives of Hawaii. This canoe has many remarkable and interesting characteristics, and is a very valuable addition to the collection of naval architecture.

A collection of bird skins and bats, including some very rare species, was presented by Valdemar Knudsen.

A collection of ethnological objects was presented from Polynesia by Messrs. Parke, Davis & Co.

I.—CO-OPERATION OF THE DEPARTMENTS AND BUREAUS OF THE GOVERNMENT.

Much valuable material is annually received by the Museum from the various Departments and Bureaus of the Government, and the National Museum acknowledges its grateful indebtedness for many important collections which have been obtained through their co-operation.

President Cleveland presented a living specimen of golden eagle. This bird was given to the President by Thomas Tomlinson, of Tate Springs, Tenn., and was transferred to the National Museum by Col. John M. Wilson, U. S. Army.

DEPARTMENT OF STATE.

A collection of foreign flags, sixty-seven in number, purchased by the Department for exhibition at the New Orleans Exposition, has been transmitted by Mr. Charles S. Hill, representative of the Department at the New Orleans Exposition.

A collection of one hundred and thirty-six samples of wool was received from the Technological Museum at Sydney, New South Wales, through Hon. G. W. Griffin, United States consul at Sydney.

Hon. William T. Rice, United States consul, Horgen, Switzerland, forwarded a collection of antique coins of copper, silver, and gold; from Ceylon, Europe, United States, and South America; and also presented six copper coins made by the English Government for Ceylon.

The Shah of Persia sent to the Department specimens of gold-bearing quartz, with the request that an analysis be made. The specimens were forwarded by the Secretary of State to the Smithsonian Institution. An analysis was made and was transmitted, with the gold button, to His Majesty through the Department of State.

Through this Department the Queen of Hawaii presented to the National Museum a canoe similar to those in use by the natives of Hawaii.

We are under many obligations to the Department for its courtesy in securing the kind offices of United States ministers and consuls in foreign countries in behalf of the National Museum.

TREASURY DEPARTMENT.

The Secretary of the Treasury has on several occasions aided the scientific work of investigators by allowing the free passage of scientific outfits. Much valuable assistance has, through the courtesy of the Department, been extended to explorers and collectors by the customs officers at various points.

Life-Saving Service.—For several years past the Smithsonian Institution has, through the kindness of Hon. S. I. Kimball, Superintendent of

the Life-Saving Service, enjoyed the assistance of the keepers of life-saving stations at various points along the Atlantic coast, in the matter of reporting the capture of whales and other large species of fishes. As the result of this co-operation during the year a specimen of file-fish, *Alutera schaeppi*, was obtained from Capt. Herbert M. Knowles, keeper of the life-saving station at Point Judith, Rhode Island. Captain Knowles also forwarded two specimens of *Epinephelus niveatus*, one of the smallest members of the family of "Groupers." This species is rarely found so far north, but is common in the West Indies and thence north to Florida. From Amasa Bowen, keeper of the life-saving station at Atlantic City, New Jersey, was received a pigmy sperm-whale.

Bureau of Engraving and Printing.—Through the courtesy of Hon. E. O. Graves, Chief of the Bureau of Engraving and Printing, a collection consisting of one hundred and thirty-two stripped India proofs of United States notes, certificates, and bonds was obtained. Two numbers of "Graphische Kunste," containing lithographs of paper money of France, Germany, Italy, and other nations, were also received from Mr. Graves.

Revenue Marine Division.—During the year 1887 the assistance of the Revenue Marine Division, under the charge of Hon. Peter Bonnett, was asked in the matter of procuring for the National Museum specimens of "bidarkas," or Eskimo kyaks. Capt. M. A. Healy, then of the revenue steamer *Bear*, was requested by Mr. Bonnett to obtain specimens, if possible, on his next visit to Alaska. His efforts were successful, and upon his return to San Francisco six "bidarkas" were placed in the hands of the Alaska Commercial Company, with the request that they be transmitted to Washington for the National Museum.

WAR DEPARTMENT.

Following the custom of previous years, the Secretary of War has permitted the quartermasters of the Army to forward from their respective posts, boxes containing specimens of natural history intended for the National Museum. This privilege has been of great benefit to the Museum, and has resulted in the acquirement by the Museum of large and valuable collections which, owing to the difficulty and expense of transportation by the ordinary means, would perhaps have been withheld from transmission.

By authority of the Secretary of War, General S. V. Benét, Chief of Ordnance, transmitted from the Ordnance Museum a plaster model of the equestrian statue of General McPherson; a section of an oak tree, cut down by musket-balls near Spottsylvania Court-House, Virginia, and presented to the War Department by General N. A. Miles, U. S. Army; a Mexican saddle and bridle, manufactured in Mexico for General Trevino, commanding the northern line of Mexico, and presented by him to General E. O. C. Ord, U. S. Army, by whom they were deposited in the Ordnance Museum on March, 23, 1878.

In connection with the preparation for the Cincinnati Exposition of an exhibit to illustrate the use of photography in scientific work, Dr. John S. Billings, U. S. Army, curator of the Army Medical Museum, was asked for assistance, and contributed a collection of twenty-two photographs, illustrating the uses of photography as applied to the work of the Army Medical Museum. Lieut. J. H. Beacom, U. S. Army, contributed the head and skin of a lake trout, and a photograph of a specimen of the same species.

Lieut. W. L. Carpenter, U. S. Army, a highly valued friend of the Smithsonian Institution, has sent some large and interesting collections from Fort Apache, Arizona. These included reptiles, fishes, skins and eggs of birds, a living Gila monster, *Heloderma suspectum*, and arrow-heads. Lieutenant Carpenter has for many years been interested in natural history research and his co-operation has always been very highly prized.

Lieut. H. C. Benson, U. S. Army, stationed at Fort Huachuca, Arizona, whose co-operation the Smithsonian Institution has enjoyed for several years, has continued his excellent work in collecting specimens of natural history for the National Museum, and during the year has contributed the skins and eggs of numerous species of birds and several reptiles. The skin of a *Trogon*, included in one of the sendings, differs from all other specimens of *T. ambiguus* in the collection, and may represent a new species.

General M. C. Meigs, U. S. Army, presented a collection of trade circulars, which contain much valuable information in regard to American industries.

A living specimen of Virginia deer, *Cariacus virginianus*, was received from Capt. R. L. Hoxie.

Dr. J. C. Merrill, U. S. Army, for many years a warm friend of the Museum, has continued to make additions to the collections, and this year contributed mammals, birds' nests and eggs, insects, shells, reptiles, fishes, and crustacea.

Dr. R. W. Shufeldt, U. S. Army, has sent mammals, birds, and ethnological objects from Fort Wingate, New Mexico.

Specimens of birds which had been killed by striking against the electric light on the statue of Liberty on Bedloe's Island in New York Harbor were received from Col. A. G. Tassin, of Fort Wood, Bedloe's Island.

A curious necklace, composed of human fingers, and collected by Capt. John G. Bourke, U. S. Army, was contributed by the U. S. Military Academy at West Point.

A short-eared owl, *Asio accipitrinus*, was sent by Surgeon T. E. Wilcox, U. S. Army.

A collection of bows and arrows of the Cœur d'Alene Indians was received from Lieut. H. T. Allen, U. S. Army.

The honorary services of Capt. Charles E. Bendire as curator of birds'

eggs, and of Dr. H. C. Yarrow as curator of reptiles and Batrachians, have been continued.

NAVY DEPARTMENT.

The Museum has received much valuable material during the year through the co-operation of officers of the United States Navy. Commodore John G. Walker, Chief of the Bureau of Navigation, has, as in previous years, given valuable assistance.

A large collection of ethnological objects, including spear-heads, paddles, oars, clubs, feather head-dresses, wooden idols, specimens of tapa, skulls, etc., were obtained by Paymaster W. J. Thomson on Easter Island, and were deposited by him in the Museum, together with a series of photographic views.*

Lieut. T. Dix Bolles gave collections of mammals, fossils, and ethnological objects.

A collection of ethnological objects from Kassai River, Central Africa, was made by Lieut. E. H. Taunt, U. S. Navy, and presented by him to the National Museum.

Dr. H. G. Beyer, U. S. Navy, continued to act until October, 1887, as honorary curator of the Section of Materia Medica, at which time he was ordered elsewhere for duty by the Department.

To the great regret of the Museum, Lieutenant Bolles, who has rendered exceedingly valuable services in the Ethnological Department, especially in connection with the work of classifying and arranging the Eskimo collections, has been recalled, having been assigned to active duty.

INTERIOR DEPARTMENT.

The National Museum is especially indebted to the Secretary of the Interior for the disbursement of the Museum appropriations, which has been very promptly and satisfactorily attended to by Mr. George W. Evans, disbursing clerk of the Department of the Interior.

Patent Office.—Two valuable ancient Greek coins have been contributed by Alexander Scott.

Indian Office.—A sketch of a fish was forwarded by Charles Willoughby, of Quinaielt Agency, Washington Territory, with a request for identification. The fish itself was transmitted later, and proved to be a new genus and species. In honor of Mr. Willoughby the scientific name of *Acrotus willoughbyi* has been given to this species by the National Museum.

U. S. FISH COMMISSION.

Through the courtesy of Colonel McDonald the Museum has continued to enjoy the valuable co-operation, as curators, of several attachés of the Commission, and collections made by the vessels of the Fish Com-

*An illustrated paper describing this collection is being prepared by Paymaster Thomson, and will be published in a future report of the Museum.

mission have been transferred to the custody of the Museum. This co-operation between the Smithsonian Institution and the Fish Commission has existed since the organization of the latter, at which time Prof. Spencer F. Baird, then Assistant Secretary of the Smithsonian Institution, was appointed U. S. Commissioner of Fish and Fisheries, and it is sincerely hoped that it will always continue.

The most important accession to the Museum, resulting from the co-operation of the Fish Commission with the Museum, was a series of collections obtained by the U. S. Fish Commission schooner *Grampus* during her expedition to Funk Island, which was organized primarily for the purpose of obtaining bones of the great auk. The expedition was very successful, and in addition collections of fishes, bird skins, birds' eggs, shells, echinoderms, sea anemones, surface towings, crustacea, copper ores, fossil shells, living birds, skins and skulls of meadow lark, and rocks were made and transferred to the Museum. Dr. T. H. Bean, while engaged in work for the Commission on the coast of New Jersey, collected fishes, crabs, star-fishes and sea-urchins in the vicinity of Great Egg Harbor. Fishes and cray-fishes were sent from the Central Station of the Commission, in Washington, from the Wytheville Station, in Virginia, and from the station at Havre de Grace, Maryland.

Collections of fishes, crustaceans, and insects were received from the summer station of the Fish Commission at Wood's Holl, Massachusetts. Important contributions of fishes, marine invertebrates, and mollusks were received from the U. S. Fish Commission steamers *Albatross* and *Fish Hawk*. Mr. Vinal Edwards contributed collections of fishes, birds, birds' nests, parasites, surface towings, crustaceans, and turtles.

The services of Mr. Richard Rathbun as honorary curator of marine invertebrates, of Dr. T. H. Bean as honorary curator of fishes, of Capt. J. W. Collins as honorary curator of naval architecture, and of Mr. R. E. Earll as honorary curator of fishes and of animal products, have been continued, through the courtesy of the Commissioner, and sincere acknowledgments are due for their valuable labors.

U. S. GEOLOGICAL SURVEY.

The Museum has enjoyed the co-operation of the officers of the Geological Survey, and this has resulted in much benefit to the Museum.

Dr. C. A. White continues to act as curator of Mesozoic Fossils; Mr. C. D. Walcott, of Paleozoic Fossils; Mr. Lester F. Ward, as curator of Botany; Prof. F. W. Clarke, as curator of Minerals, and Mr. William H. Dall and Dr. R. E. C. Stearns as curator and adjunct curator, respectively, of Mollusks.

Among the collections of fossils, rocks, ores, and minerals made by officers of the Geological Survey and transferred to the National Museum may be specially mentioned those which were collected by Messrs. Frank Burns, W. G. Brown, Whitman Cross, C. W. Cunningham, William H. Dall, S. F. Emmons, W. F. Hillebrand, L. C. Johnson, R. E. C. Stearns, and C. D. Walcott.

J.—EXPLORATIONS.

In October, 1887, a Department of Living Animals was organized, chiefly for the purpose of affording opportunity for study in connection with certain kinds of work then being prosecuted in the Museum. It was decided that hereafter all gifts of living animals which might be offered to the Museum would be accepted, cared for in the best manner possible, and exhibited, with due credit to the donors. It was also decided that whenever it was found possible to purchase a living wild animal for study purposes at a nominal price, it might be done. In accordance with this determination, Mr. W. T. Hornaday was permitted by the U. S. Commissioner of Fish and Fisheries to make a collecting trip on fish car No. 1 to and through Dakota, Montana, Idaho, Washington, Oregon, and Utah in the interest of this department.

Mr. Hornaday left Washington on October 8, with Mr. J. Frank Ellis, in charge of the car, and proceeded westward. In the course of the work of distributing fish the car made brief stops at St. Paul; Fargo, Dakota; Mandan and Helena, Montana; Tacoma, Washington; Portland, Oregon; Mountain Home, Idaho, and Salt Lake City, Utah. As soon as it became known at those points that the National Museum was ready to accept gifts of living animals, several specimens were presented, and others of desirable kinds were purchased at nominal prices. The most important of the animals collected and brought to Washington by Mr. Hornaday were the following: 1 Columbian black-tailed deer (*Cariacus columbianus*), 1 mule deer (*Cariacus macrotis*), 1 white-tailed deer (*C. virginianus*), 1 cinnamon bear (*Ursus cinnamomum*), 2 badgers (*Taxidea americana*), 2 red foxes (*Vulpes fulvus fulvus*), 1 cross fox (*Vulpes fulvus decussatus*), 2 spotted lynxes (*Lynx maculatus*), 5 prairie dogs (*Cynomys ludovicianus*), and a golden eagle (*Aquila chrysetus*). All of these animals were brought back in the fish car, a task which involved infinite labor and care. The trip, on the whole, was a highly successful one, and the relations established with Western hunters and collectors are certain to prove of value to the Museum. The car returned to Washington on November 8, having traveled over 7,000 miles.

In the summer of 1887 arrangements were made for a joint expedition by the U. S. Fish Commission and the Smithsonian Institution to Funk Island and the coast of Newfoundland. The Fish Commission tendered the use of the schooner *Grampus*, which was to be engaged, under the command of Capt. J. W. Collins, in the investigation of certain fishery problems, and Messrs. F. A. Lucas and William Palmer were detailed from the National Museum to accompany the expedition.

An examination of Funk Island was made, and a large number of bones of the Great Auk were collected, including several crania and many hundred vertebræ, and leg and wing bones. The coasts of Newfoundland, of New Brunswick, and the Magdalene Island and adjacent

islands were also visited with a view to collecting specimens illustrating the fauna, flora, and geology of the regions. The collectors were very successful. They secured about two hundred bird-skins, a large series of birds' eggs and nests, fishes, mammal skins and skeletons, marine invertebrates, fossils, plants, rocks, and copper ores.

Interesting collections were received from Mr. Charles H. Townsend, who visited Central America by direction of the U. S. Commissioner of Fish and Fisheries. The material obtained included plants, a collection of bird-skins numbering over three hundred specimens, a collection of tropical insects, a small collection of mammal skins, skulls, and skeletons, bird skeletons, birds' nests, fishes, reptiles, stone implements, and twenty-seven ethnological objects.

K.—REPORT UPON THE PARTICIPATION OF THE SMITHSONIAN INSTITUTION IN THE INDUSTRIAL EXPOSITION AT MINNEAPOLIS, 1887.

By WILLIAM V. COX.

In accordance with joint resolution No. 18, which authorized the several Executive Departments of the Government to lend to the Minneapolis Industrial Exposition of 1887 certain articles for exhibit, Dr. G. Brown Goode, Assistant Secretary of the Smithsonian Institution, in charge of the National Museum, being unable himself to leave his official post, appointed W. V. Cox, chief clerk of the National Museum, representative to the Exposition. A copy of the letter making this appointment is given herewith, and also a copy of joint resolution No. 18.

[PUBLIC RESOLUTION No. 18.]

JOINT RESOLUTION authorizing the several Executive Departments of the Government to loan to the Minneapolis Industrial Exposition certain articles for exhibit.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That it is desirable, in any way consistent with existing laws and without risk to Government property or expense to the National Treasury, to encourage the effort being made for the opening and holding of a grand industrial and educational exposition of the Northwest at the city of Minneapolis, in the State of Minnesota, and the interests of the whole northwestern section of our country demand it to be made an unqualified success; and it be, and is hereby, approved that the heads of the several Executive Departments shall, in whatever respects they may in their judgment see convenient and proper, loan any articles or material suitable to such purpose: *Provided*, That such loan be made entirely on the responsibility of said Minneapolis Industrial Exposition, and shall not be of material needed for use in either Department, and shall not in any way interrupt the daily routine of duty or order in any branch of the Government, and shall be returned to the proper Department, in good order, within one month after the close of the exposition: *And provided further*, That before any such loan shall be made, the proper head of the Department shall require and receive a good and sufficient bond, by or in behalf of such exposition, for the safe return thereof as aforesaid, and to indemnify and save harmless the Government of the United States, or any Department thereof, from any liability or expense on account thereof, or on account of this resolution.

Approved March 3, 1887.

SMITHSONIAN INSTITUTION, U. S. NATIONAL MUSEUM,

Washington, June 1, 1837.

SIR: In addition to your regular duties, you will take charge of the Smithsonian and Museum part of the Minneapolis Exposition, and represent me in all transactions with the board of management, as may be necessary under joint resolution of Congress (No. 18). You will confer with me only upon questions of general policy, relieving me entirely of all matters of detail.

As representative to the exposition, it will be necessary for you, at its conclusion, to submit a report on same.

Very respectfully,

G. BROWN GOODE,

Assistant-Secretary Smithsonian Institution,

in charge of U. S. National Museum.

Mr. W. V. Cox,

Chief Clerk National Museum.

Mr. Fred. Brackett, Washington agent of the exposition, was assigned to the duty of collecting and forwarding to Minneapolis the exhibits from the various Departments of the United States Government, and of receiving these exhibits on their arrival at their destination. To Mr. Brackett's efficient discharge of these services, both in Washington and Minneapolis, much of the success which attended the Government display at the exposition is due.

Before the Government exhibit left Washington the board of managers of the exposition gave bond in the sum of \$5,000 for its safe-keeping while it should be in their charge, and, in addition, allotted \$850 to cover the expense of preparation, packing, and repacking the exhibit, and for freight charges both ways. The car-load of cases and exhibits left Washington for Minneapolis August 22, but did not reach its destination till August 26. By hard work, however, nearly the entire exhibit—20,157 pounds—was in order and ready for exhibition on the morning of August 31, the day of the opening of the exposition.

The immense building, 336 by 356 feet in size, with floor space of $7\frac{1}{2}$ acres, provided for the exhibition, proved insufficient for the general display, and the managers found it necessary to assign smaller space to the Government exhibits than had at first been allotted. A part of the ladies' reception-room was, however, finally partitioned off as an annex to the space for the display of the Smithsonian Institution and the National Museum, which may be briefly enumerated as follows:

- I. Ethnological exhibit, including prehistoric relics of America, casts, lay figures, models, etc. An extensive series of casts of Indian faces, Zuñi objects, etc.
- II. Textiles and fabrics.
- III. Display in the department of metallurgy.
- IV. Deer antlers and horns.
- V. Casts of fishes of North America.
- VI. Photographs of Government buildings.
- VII. Articles illustrating the composition of the human body.

The ethnological display included relics of the prehistoric tribes of America, together with a large collection of Eskimo and Indian costumes, carved dishes, spoons, children's toys, and a collection of the

musical instruments and of the various war implements of the savage tribes of this and other countries; models and lay figures dressed in the costumes of different lands; and an extensive series of casts of Indian faces, representing and accentuating race and individual peculiarities and characteristics.

In the section relating to domestic industry many of the agricultural implements in daily use in foreign countries, especially in China and Japan, were shown; also articles of clothing, cooking utensils, chop-sticks, carpenters' tools, etc.

There were also exhibited tablets showing the different stages in making Japanese lacquer-work of the ordinary kind, and of the raised gold lacquer, with explanatory cards describing the same.

In the department of textiles and fabrics the exhibit ranged from the different varieties of hemp, flax, China-grass, worsted yarn for carpet weaving, and specimens of the different styles of carpets, to samples of the finest Italian and French silk-weaving. This exhibit also included silk moths and cocoons in the various stages of development, many specimens of unwoven silk, and a historical sketch of the silk industry in America, indicating the sources and varieties of the different grades of silk.

In the department of metallurgy were shown fac-similes of some of the most famous Australian gold nuggets.

In the division of natural history the display of antlers and horns of the American deer was extensive, and there were also shown many casts of the fishes of North America, besides other objects.

Large photographs of the Department buildings in Washington, and of the Smithsonian Institution and National Museum, their laboratories and workshops, were shown. There were also many interior views of the Museum, displaying articles that could not otherwise be shown.

Articles illustrating the composition of the human body, its daily income and expenditure, were exhibited, with specimens of the chemical elements and compounds of the body, and models of the articles of food constituting a day's ration for a man of average size.

The entire Government exhibit proved to have been so selected and arranged as to attract attention to all its parts in about an equal degree. So much interest, in fact, was felt that the exposition management made repeated requests to keep the articles for the following year. In spite of the great desire manifested to insure another exhibit in 1888, the entire Government property was returned in November, having suffered no injury beyond the breaking of a few panes of glass in the cases.

I am greatly indebted to Professor Mason for valuable assistance in arranging the ethnological exhibits, and to Professor True for like aid in selecting and classifying specimens in the department of mammals. Mr. Upham also gave efficient help in the matter of prehistoric relics, and Superintendent Horan and Assistant Superintendent Steuart were untiring in the work of boxing, packing, shipping, and installing the exhibit.

SECTION II.

REPORTS

OF THE

CURATORS OF THE UNITED STATES NATIONAL MUSEUM

UPON THE

PROGRESS OF WORK DURING THE FISCAL YEAR
ENDING JUNE 30, 1888.

REPORT ON THE DEPARTMENT OF ETHNOLOGY IN THE U. S. NATIONAL MUSEUM, 1888.

By OTIS T. MASON, *Curator*.

At the commencement of the year a new assignment of halls was made, rendering it necessary to modify the distribution of specimens in west hall. In pursuance of the Museum policy to find a significant place for everything that has a name, three concepts of different values have been worked out. At the east door all the material from various sources used in transportation on land has been brought together, commencing with the simplest device for carrying burdens by the human (freight carrier) pack animal or for traveling over snow, and ending with the locomotive. All this material, after its selection, was turned over to Mr. Watkins, in charge of the new section of transportation.

Another method of treatment is seen in the Eskimo department, just completed by the help of Lieut. T. Dix Bolles, U. S. Navy. Here the primary and ruling concept is a definite and well characterized area. All the conditions of life are written. The highest realizations of this life are from home resources. In later years European wrecks and European influences have brought iron, tobacco, rum, etc. But anterior to this the Eskimo lived in his Arctic home as though there were no other people on the earth. In the court devoted to this area each Eskimo art is traced from Greenland to Kadiak by specimens. If the Museum lacks example from any one of these, a vacant space is left and specimens sought to supply the deficiency.

During the coming year the same attempt will be made with the region lying between Mount St. Elias and the Columbia River, the Great Interior Basin, and Polynesia.

Another line of investigation has been still more special and all the material is arranged accordingly. I refer to bows and arrows. The object is to file away type bows and arrows from every tribe on earth, so that they can be laid side by side for comparison or can be treated ethnically. Shallow boxes 5 feet long, 2 inches deep, and 2, 4, and 6 inches wide are made of thin pine, all interchangeable. These boxes fit in a crate which in its turn fits on a shelf like a book. On the outer edge or back of this crate may be pasted a label indicating the contents. It is just as easy to refer to the arrows of a particular tribe as it would be to find

a reference in a volume. The plan of indicating deficiencies in the series is the same as in the Eskimo collection.

Another line of work pushed forward during the year is the ethnic series. The object of this exhibit is to show representatives of all the races of men in the most exalted manner practicable. The simplest form is the colored photo in front and profile, properly colored and shown on swinging screens. Another mode of exhibiting is by means of casts of the heads of Indians and others, arranged by a scheme of races or figures in costume, either singly or in groups containing male and female or families. During the year models of an Eskimo family, of a group of Zuñis, and of a group of Pai-Utes have been placed upon exhibition.

The most valuable local series acquired has been that of Paymaster William J. Thomson, U. S. Navy, from the Easter Islands.

In connection with my work I glean from all sources the scraps of valuable information which can be gathered from the books of travelers, explorers, missionaries, commercial agents, etc. A regular system of card cataloguing is used, each separate statement written on a distinct slip and these placed in drawers, together with newspaper cuttings, excerpts, and pamphlets relating to the same subjects.

Prof. G. Stanley Hall, of Johns Hopkins University, has made use during the year of the resources of the collection, in investigating the subject of mythology from the psycho-physical point of view, the purpose of his studies being to trace the phases of hypnotism and kindred phenomena known in our day to something akin in savagery and among primitive people.

During the early months of the year much time was expended in preparing a series of specimens for the Minneapolis Exposition, and later, a still greater display was prepared for Cincinnati.

Papers have been prepared for publication on the Quinaielt Indians of Washington Territory, on the Stone Age in Washington Territory, on the arts of the Navajo, and on the cradles of the American aborigines.

Extensive exchanges of specimens have been effected with Mr. Lovett, of England, and Professor Putnam, of Peabody Museum.

In a course of Saturday lectures delivered in the Museum the following were on anthropological subjects:

Prof. HERBERT B. ADAMS: University Extension in England, Baltimore, and Washington.

Prof. H. N. EGLESTON: The Origin of our Names.

Prof. PAUL HAUPT: Excavation in Assyria and Babylonia.

Prof. WILLIAM LIBBEY, Jr.: Southeastern Alaska and its People.

Prof. G. STANLEY HALL: Psychic Research in England, and the Recent Study of Hypnotism in France.

Prof. OTIS T. MASON: Woman's Share in Primitive Culture.

Maj. J. W. POWELL: The Course of Human Progress.

Total number of specimens received, 1,700; catalogue No. 129210 to 130000.

CLASSIFIED LIST OF ACCESSIONS TO THE DEPARTMENT OF ETHNOLOGY.

- Greenland*.—Mrs. Mildred McLean Hazen (20458): Kayak models (3).
- Point Hope, Alaska*.—Capt. M. A. Healy, U. S. Revenue Marine (19774): Model oomiak; kayak; float. Cape Blossom, bird-spears (2); throwing-stick; kayak; seal-dart. Cape Krusenstern, kayak. Cape Espenburg, ice-bailer; kayak. King's Island, harpoon line; throwing-sticks (2); kayak; float.
- Kotzebue Sound, Alaska*.—Lieut. George M. Stoney, U. S. Navy (—): Sleeping-bag; pants; skull cap; deer-skin coat; boots (2 pairs).
- St. Michael's, Alaska*.—Lucian M. Turner (19248): Water bucket; knives (4); buttons (2); drill bows (3); sinker; throwing-stick; half-shoes; connector of toggle joint and spear shaft (2); thimble holders (2); belt; bow; fish-hooks (2); belt toggles (6); baskets (3); lip studs (3); labrets (4); becket of kayak; trifle boxes (2); spears (2); water-proof coat; gouges (3); toy kantag; hand spear; bodkins (4); ammunition bag (2); sledge model; arrow heads (2); reindeer arrows (10); work-bag stiffeners (3); ear-rings (3); sea-lion tusk; hunter's tally; jadeite drill; harpoon points (3); stone knife; hand rests for drill (2); carvings (14); knife-sharpener; seal pendant; needle cases (5); girl's coat; seal arrow; powder-horn; spear model; seine needle; dolls (5); kantag handle; kayak models (5); snuff tubes (2). Upper Yukon River: Coat; pants; stockings; cap; moose-skin coat; tobacco pouch; pipe and stem; moccasins; bags (2); sea-lion whiskers. Mrs. Mildred McLean Hazen (20458): Woman's coat; rain coat; man's coat; woman's breeches; kayak model; arrow; bird bolas.
- Sitka, Alaska*.—Mrs. George M. Robeson (20537): Arrows.
- Vancouver Island, British Columbia*.—Dr. Franz Boas (19597): Mask "Raven;" wooden images (2); neckrings (3); masks (3); head-ring.
- Fort Rupert, British Columbia*.—James G. Swan (19477): Indian dance-house model; Indian house with totem post (model).
- Spokane Indians, Washington Territory*.—Mrs. Anna C. McBean (20048): Cradle; tobacco pouch and Indian tobacco; money pocket; shell necklace; war club; woman's hat.
- San Francisco, California*.—R. E. C. Stearns (19941): Chinese water-holders (2); opium-pipe bowls (4); pencil holder; sandal-wood.
- Santa Barbara, California*.—Barnett Phillips (20567): Stone pipe.
- Cœur d'Alene, Idaho*.—Lieut. H. T. Allen (19372): Quiver; bows (2); arrows (5).
- Cheyenne*.—Capt. J. G. Bourke, U. S. Army (19685): Necklace of human fingers. Lieut. H. M. Creel, U. S. Army (20615): Tobacco bag; catlinite pipe; awl-case; "straw" dance sash; moccasins; crooked lance ensign; target arrows; knife scabbard; bow; quiver and arrows.
- Arapahoes*.—Lieutenant Creel: War shield.
- Crows and Assiniboinés*.—J. I. Allen (20493): Bow and arrows; war bonnet; painted elk skin; "medicine" horn.
- Sioux*.—Lieut. H. M. Creel, U. S. Army (20615): War bonnet; gun cover; deer call; saddle bags; navel ornament; pappoose bonnet; breast ornament; knife tomahawk.
- Gros Ventres*.—Breast ornament and tomahawk pipe. William T. Van Doren (19423): Head dress; leggings; catlinite pipe; pipe pouch.
- Colorado*.—Dr. Edward Wyman (20493): Miner's candlestick.
- Navajo Indians*.—Dr. Washington Matthews, U. S. Army (20077): Pendant for neck; sinch; helmet.
- Narajoes, Fort Wingate, New Mexico*.—Dr. R. W. Shufeldt, U. S. Army (19540): Photographs illustrating the process of tanning (7); dressed buckskin; scraper for removing hair in tanning.
- Apache Indians*.—A. F. Randall (20263): Photographs of Apaches (20). Thomas C. Allen (20493): Section of cactus stalk (house post).

- Chippewa Indians*.—Lieut. H. M. Creel, U. S. Army (20615): Pipe and stem; beaded pouches (2); tobacco pouch; lacrosse racket.
- Menominee Indians*.—S. Patrick (20350): Bow and arrows (4).
- Seneca Indians*.—Andrew John, jr. (20224): Brooches (2).
- Arkansas*.—G. Brown Goode (20757): Bowie knife.
- Kentucky*.—J. A. Jagers (19867): Stone tomahawk.
- Ticonderoga*.—Dr. G. F. I. Colburn (19486): Old pocket knife; stone knife-blade.
- Seminoles*.—G. M. Matthews (20566): Iron tomahawk.
- Connecticut*.—James H. Peffen (19720): Iron knuckles, ball, and chain.
- Cherokees*.—W. T. Van Doren (19745): Wooden pipe.
- Massachusetts*.—Mr. Shebnaah Rich (20563): Kyal lamp. Francis B. Smith (20703): Tinder-box; candle-dish; sconce.
- District of Columbia*.—Dr. C. A. V'Hartleben (19964): Tooth extractor. W. B. Cooper (20771): Float for night-light; candle extinguisher (2). Peter Burger (20727): Old caster. Hon. A. A. Lipscomb (20628): Knives made by convicts. Prof. O. T. Mason (20465): Jewish door-post charm. T. E. Ferguson (19936): Stone grown in a sapling. R. J. Thompson (19636): Shoeing hammer; miniature blacksmith tools; samples of light and heavy forging. L. Blue (19634): Hand corn-sheller. William H. Myers (19635): Razors (2). P. H. Skidmore (19493): Dried hand of negro woman (fetish). Dr. J. R. L. Hardesty (19782): Pair of old spectacles.
- Alexandria, Virginia*.—Susan Taliaferro (20164): Old cake-cutter.
- Baltimore, Maryland*.—T. W. Sweeney (19619): Dagger; tobacco-stripping knife; plane; channeling-tool; spring saw.
- Yakis of Sonora*.—Dr. E. Palmer (20605): Clam-digger's outfit; cactus fruit-pickers (3); Pascal dance-belt; mask; rattle and drum; wattling made of cane; shoemaker's smoothing-stone; boy's hockey sticks and ball; war-club; root-digger of bone; torches of candle-wood; water-jar; native-made silver spoon; flower earrings; vegetal dye-stuffs; gardener's account; mat; hat; red paint; bed of matting.
- Pueblo and Xochiapuleo*.—G. B. and W. B. Hyde (19708): Winged stone image; stone image; loom; spindle.
- Legonia River, Central America*.—C. H. Townsend (19811): Muller; hammock; carrying nets of bark (6); canoe and paddles (3); packing-basket; outfit for making blaukets of bark; bows (3) and arrows (3).
- Costa Rica*.—R. Ridgway and J. Fleming (19819): Photos of Guatusos; arrows (6).
- Chili*.—W. E. Safford, U. S. Navy (19026): Model of balsa; bag strings (2); colored yarns (8); pan-pipe (1); coiled basket; bags (12); maté gourd and bombilla; wattlings (2); cloths (4); set of reeds; netting; top; comb; slings; spindle whorl; necklace of teredo shells; fish-spear head. J. S. Solar (20256): Felt hat.
- England*.—Edward Lovett (20116): Early English pipes, time of William III (3); old English steel and flints. Mrs. E. S. Brinton (18908): "De Pace Regis." Pulton (1609): "Exercitationes on Epistle to Hebrews." J. Owen, D. D. (1663): "Discourses concerning the nature of man." J. A. Lounde (1694): G. Ravené (19645): Brass cartridges.
- France*.—Minister of public instruction (19985): Statue of Roman soldier. Thomas Wilson (19851): Strike-a-light. Edward Lovett (20116): Strike-a-light.
- Antwerp*.—Mrs. E. S. Brinton (18908): Straw bonnet; milk-woman's lace cap; quaint straw bonnet with photo; German peasant's slippers and shoes. Thomas Wilson (19851): Wooden shoes, Munich calendar. Edward S. Lovett (20116): Old German gun-flints.
- Norway*.—Mrs. E. S. Brinton (18908): Doll in costume; carved wooden spoon; carved jewel-box; ethnographic photos (23); pocket-knives (2); gilt silver bangle rings (2); ancient brooches (2); silver chain with coin pendants; silver buttons (2); village cart; cariole; portrait of Christian IV (1596-1648); knit gloves; peasant's belt and five silver ornaments; embroidered gloves; peasant's jack-knife; ethnographic photos (12); silver buttons (12); peasant's traveling-box.

- Rome*.—Mrs. E. S. Brinton (18908): Copy of Catacomb lamps (3); antique lamps (4); butter-stamp; antique design; bronze chariot and horses; statuette of Mercury; modern Roman lamp; Pompeian lamps (3); bronze statuette of Romulus and Remus; antique inkstand; copy of Etruscan lamp; candle-stick (Bacchus reclining); filigree cross from Genoa; child's shoes; Naples figurines (4). Thomas Wilson (19851): Bronze lamp; seal of glass; phallic image; wooden slippers.
- St. Petersburg*.—Mrs. E. S. Brinton (18908): Brooch; prayer tablet; prayer amulet.
- Greece*.—Mrs. E. S. Brinton (18908): Red shoes; wooden sandals; Roumanian necklace and bracelet.
- Egypt*.—Dr. James Grant-Bey (19747, 19601, 20440, 20421): Bandages of mummies (2); small mummy case; porcelain ring; Turkish coins (8); Theban beetles (2); figure of Thoth-Hermes; *Shubti*, small porcelain figures (2); papyri fragments; amulet; fragments of "Book of the Dead" (15); mummy cloth (2); pottery-mold; bronze duck; scarab of Hathor; lotos flower; aromatics from a mummy (2); body of mummied hawk; gold ornaments of Thothmes III; painted mummy cloth; mold of Ra Atun; fragment of mummy wrapping of Rameses II; bronze figure of Osiris; bronze cat; beads (16); fragments of porcelain ring; stele of Horus; squeezes of inscriptions at Karnak (17); drawings of botanical sculpture from Karnak (8); Arabic almanac; Roman coins (5); bronze uræus; model of head-rest; glass; mosaic from Leptis Magna.
- Cairo, Egypt*.—Mrs. E. S. Brinton (18908): Inkstand and pen-holder; purse; ear-rings; necklace.
- Africa, Congo River*.—Lieut. E. H. Taunt, U. S. Navy (20681): Digging-hatchet; sword in sheath; bill hook; drinking-cup; bows (7); copper currency; hunting-arrows (12); war arrows (15); pipe and stem, assagais (3); feather head-ornament; head-dress; woven cap; amulets (2); ivory buttons (6); drinking-horn; sword and scabbard; short swords (3); hair-pins (4); necklaces (2); embroidered grass cloths (2).
- Tunis*.—Mrs. E. S. Brinton (18908): Brass tray; straw basket; slippers; shoes.
- Zulus*.—Edward Lovett (20116): Pipe.
- Madagascar*.—Edward Bartlett (20093): Beads; tweezers (6); combs (2); spoons (3).
- Palestine*.—Mrs. E. S. Brinton (18908): Amulet from Lebanon. From Damascus, porcelain cup and cup-holder; bronze candle-stick; slippers; bronze vases; antique bowl; bracelet of six coins set in filigree; shoes. From Shechem, lamps (2).
- Babylon*.—Thomas Wilson (19815): Contract tablets (2). Thomas F. Bayard (20315): Cast of seal.
- India*.—Rev. C. H. A. Dall (17855): Bronze bells (2); woman's clog shoes; offerings (8); cowries; child's wooden clogs; pictures of the ten incarnations of Bhagavati; carved frames (2); pottery cups; wax tapers (6); boatman's hat; incense sticks. Dr. James Grant-Bey (19747): Leaf from a Hindoo book.
- Burmah*.—Rev. C. H. A. Dall (17855): Wax offerings (9); brush; fan; figure of Budh; image; priest's begging bowl and stand; lacquer cups (2); pottery cup; model of boat; Pan-boxes (4); green cheroots (3); priest's dress; lady's ear-stretchers; leaves of Burmese book; tray basket; photo of Burmese priest; photo of Burmese lady; Burmese sword.
- Persia*.—Dr. James Grant-Bey (19747): Sample of needle-work.
- China*.—Barnett Phillips (20567): Opium pipe. Dr. Hugh M. Smith (19724): Counters for game (9). Lieut. T. Dix Bolles (19793): Ivory carving from Canton.
- Corea*.—Gustavus Goward (19329): Screen; pipe-stem; photo of porcelain screen; photo of painted screen; photo of cabinet. Pierre L. Jouy (19537): "Chung Sung" or roadside sign-post. (19792): Bow and arrows; pipe-stem borer, (19825): Cast of face of ancient statue of Buddah. (19638): Ax.
- Japan*.—Prof. G. Brown Goode (20368): Pieces of armor (17). Gustavus Goward (19374): Sketches by Japanese artists (25). Thomas Wilson (19851): Fine comb; bronze mirror. Lieut. T. Dix Bolles, U. S. Navy (19429): Swords (3); writing-case and materials; bronze ash receiver. Tokio Museum (20443): Saddle.

- Easter Island*.—Paymaster W. J. Thomson, U. S. Navy (20078, 20093): Conjuring wands (4); adze-blades (33); ceremonial paddle; tapa cloth; boat-paddles; spear-heads (134); ceremonial clubs (2); haversack; skulls (3); gourd vessels (3); head-dresses (6); large net; stones from dwellings (37); bark-peeler; adzes (2); red paint; grooved stone; celt; cupstone; semilunar stone; net-needles (2); cylindrical stone; carved wooden figures (3); carved stones (3); fish-hooks (3); inscribed wooden tablets (2). John C. Lang (20791): Easter Island. Carved wooden image.
- Polynesia*.—Parke, Davis & Co. (19712): Solomon Island; arrows (3); club; Fiji arrows; New Hebrides fish-hook; adze-handles. Museum of Natural History, Paris (19396): Busts of natives as follows: Levuka, Varas, Tonga, Tarik, Caroline Island, Mougnaie, Manga-Reva, Gambier Island, Graham Island (?), Hogolen, Caroline Island, Isabella, Solomon Island, Mozambique, Madagascar.
- Photographs*.—G. Goward (19374): African laborers (5); coal-heavers (10); Martinique; Caledonian women (10); Fijian chiefs (10); Caledonian weapons (5); Fijian chiefs (4); Caledonian natives (5). S. C. Brown (16631): Jamaica (52). Mrs. L. M. Pavy (20614): Arctic pictures. Mrs. E. S. Brinton (18908): Ethnological photos (6). W. J. Thomson, U. S. Navy (20511): Easter Island. Parke, Davis & Co. (19610): Easter Island tablets.

REPORT ON THE SECTION OF ORIENTAL ANTIQUITIES IN THE U. S. NATIONAL MUSEUM, 1888.

By CYRUS ADLER, *Assistant Curator.*

The Section of Oriental Antiquities of the U. S. National Museum was formally organized on February 2, 1888, by the appointment of Paul Haupt, Ph. D., professor of the Semitic languages in the Johns Hopkins University as honorary curator, and of Cyrus Adler, Ph. D., instructor in Semitic languages at the same University, honorary assistant curator.

The steps which led to the organization of this section were taken almost a year previous. In March, 1887, a letter was addressed to the late Prof. Spencer F. Baird, calling attention to the importance of Oriental archaeology, and more especially Assyriology, and recommending that the National Museum add this to its numerous departments of study and research. The illness and subsequent death of Professor Baird delayed official action in the matter, but the work was tentatively inaugurated at the beginning of the fiscal year.

In July, 1887, a portion of a collection of Assyrian and Babylonian seals gathered by the late Rev. William Frederick Williams, an American missionary at Mosul, was placed at the disposal of the Museum for copying purposes, by the present owners, Mr. R. S. Williams, of Utica, Dr. G. H. Williams, of Baltimore, Mr. Talcott Williams, of Philadelphia, Miss C. D. Williams, Mr. P. V. Rogers, and Dr. A. G. Bower.

The Museum modelers were so successful in producing fac-similes and flat impressions of these objects that the following announcement was made at the fall meeting of the American Oriental Society, held at Baltimore in October, 1887 :

The National Museum at Washington has undertaken the formation of a study-collection of casts of Assyrian and Babylonian antiquities in association with the Johns Hopkins University of Baltimore. The Museum stands ready to make fac-similes and casts of Assyrian and Babylonian antiquities. An attempt is being made to first obtain copies of Assyrian antiquities preserved in this country. The Johns Hopkins University will attend to the proper arrangement and cataloguing of the

Assyrian collection in the National Museum, under the supervision of Dr. Paul Haupt, professor of Semitic languages, and Dr. Cyrus Adler, assistant in the Semitic courses, who will also cooperate in the work of forming the collection and of securing the loan of objects to be copied.*

Through the courtesy of the Rev. Dr. J. Packard, of the Episcopal Theological Seminary at Alexandria, Virginia, the Museum was permitted to make molds of two Assyrian slabs of alabaster in the possession of the Seminary, received in 1860 from Dr. H. B. Haskell, missionary-physician at Mosul.

Prof. A. Crawford, of the same institution, permitted the Museum modelers to make a mold from his cast of the black obelisk of Shalmaneser, and of the so-called Egg of Sargon I, for the Cincinnati Exposition, when it became evident that the British Museum could not furnish these objects in time.

The Rev. A. N. Andrus, of Painesville, Ohio, sent for copy an Assyrian seal purchased in Mardin.

The entire month of June was devoted to preparations for a contribution to the Ohio Valley Centennial Exhibition, to which the section of Oriental Antiquities contributed an exhibit of Biblical archaeology. This special department of study was chosen because in the field of oriental research Mesopotamian and Egyptian antiquities, especially such as bear upon the Bible, are of most interest to the public. By Biblical archaeology is understood the study of the language, history, social life, arts, and religion of the Biblical nationalities. This study is not a part of dogmatic theology; its results can command the same acceptance accorded to a new fact reported from a physical laboratory; its problems should be faced in the same spirit of fearless investigation into the truth as obtains in other departments of scientific research.† Through it the Bible becomes, in its form and to some extent in its substance, a new book. Many an allusion which hitherto had no meaning or had lain unnoticed, starts into prominence and throws a light over a whole passage.‡ Nor are these investigators entirely confined to the ancient world. Owing to the intense conservatism of oriental peoples, a careful study of the modern inhabitants of western Asia may exhibit in a new aspect the manners and customs of former times.

Proper names, dialectic forms, architecture, costumes, and, what is more surprising, considering the numerous changes of faith which culminated in Mohammedanism, even religious practices have persisted in the East through thousands of years. As there may be some objection to the application of the term "archæology" to so broad a field, it might perhaps be better if the more comprehensive term "Biblical science" were employed to designate this study. Nor is the area covered less

* Compare Oriental Society Proceedings at Baltimore, October, 1887, p. CCXXXIV; Johns Hopkins University Circular, No. 62, January, 1888; and an article by Prof. O. T. Mason in the Epoch, February 10, 1888.

† Compare Twenty-one Years' Work in the Holy Land, p. 8.

‡ *Ibid.*, p. 16.

extensive than the period of time. Roughly speaking, it would require that one point of a compass be placed in Jerusalem, and a radius of a thousand miles be selected to describe a circle which would include all of the peoples with whom the Israelites came in contact during their national existence. On this basis an exhibit was prepared which will be fully described in a special paper in the next annual report.

In March, Professor Haupt, under the auspices of the Saturday Lecture Association, delivered a lecture in the National Museum on Excavations in Assyria and Babylonia, portions of which are appended as being explanatory of the objects of the new department. The lecture was illustrated by charcoal drawings of the Rock of Behistun, of the sculptures it contains, and a plan of the "Tower of Babel," prepared and colored after the description given in the lecture.

EXCAVATIONS IN ASSYRIA AND BABYLONIA.

BY PROF. PAUL HAUPT, PH. D.

On the old highway from Babylon to Media, in the region which the ancients called Bagistana, the abode of the gods, there rises, 1,700 feet above the plain, a steep and precipitous rock, the front overlaid with polished white marble, covered with reliefs of colossal figures. Nine men, a rope around their necks, their hands fastened behind their backs, approach a majestic person, treading under foot the body of a prostrate enemy, and extending his left hand with an imperious gesture. Over the whole group hovers Auramazda, the Persian god of light, blessing the king and offering a royal diadem.

Ktesias, the Greek physician of Artaxerxes II, attributed the monument to the fabulous queen Semiramis; and at the beginning of this century Sir Robert Ker Porter, the famous English traveler, believed that the sculptures represented Tiglathpileser and the ten tribes, while Keppler explained them to be Queen Esther and her attendants.

The French Government sent the architects Coste and Flandin to examine the monument and copy the inscription of four hundred lines in cuneiform or wedge-shaped characters. But they returned with their purpose unaccomplished, stating that the monuments, being 300 feet above the ground, were inaccessible.

In the years 1835 to 1837 Sir Henry Rawlinson, then a young officer in the East India service, succeeded, in the face of unspeakable difficulties, and at an expense of more than £1,000, in copying a portion of the inscriptions. Not until ten years later was he enabled to complete his copy. In 1846 he published the first explanation of the inscription, which commemorates the victories gained by the great Persian king Darius Hystaspes over the rebels in the numerous provinces of his vast empire. It is composed in three different languages. Just as the governor of Bagdad in our days, if he wishes to be understood by the various races under his charge, has to draw up his edicts in Turkish, Arabic,

and Persian, so the inscriptions of the Achæmenian kings were accompanied by parallel translations of the old Persian original, one for the inhabitants of Susiana, the Elam of Scripture, the other in a language akin to modern Arabic and the sacred tongue of the Old Testament, representing the speech of the Persian province of Assyria, formerly the center of the great Mesopotamian empire, which had succumbed to the Persian conquerors after the fall of Babylon.

The trilingual inscriptions on the rock of Behistun are the foundation of the grand edifice erected by Assyriology out of the rubbish of the Assyrian palaces and the temples of Babylon.

The decipherment of the old Persian wedge-writing in 1802, one of the most remarkable achievements of modern science, due to the genius of a young instructor at the college of Göttingen, George Frederick Grotefend, made it possible to solve the mystery of the parallel versions, in the languages of Elam and Mesopotamia.

At first the study of these texts in the intricate Assyro Babylonian script promised but little reward. But suddenly the excavations in the valley of the Euphrates and Tigris revealed numerous inscriptions exhibiting the same system of writing, thus rewarding the decipherment of the old Persian cuneiform texts in a way not dreamed of. Stamped on bricks in the walls of the building, buried on clay prisms and barrel cylinders, in the foundations of temples and palaces, spread over marble and alabaster slabs, on the floors and walls of the royal apartments, carved on statues, obelisks, and colossal cherubim, inscribed on terracotta tablets, gathered into extensive libraries—a new literature, almost boundless in its extent and scope, was recovered from the ruins of ages.

Nineveh, the great stronghold on the Tigris, founded by Nimrod, the mighty hunter before the Lord; Nineveh, of which the Prophet Nahum said that she was full of men like a pool full of water, her merchants multiplied above the stars of heaven; Nineveh, the abode of Shalmaneser, Sennacherib, Sardanapalus, whence poured forth over all western Asia the irresistible Assyrian hosts like swarms of locusts; Nineveh, which seemed to have vanished from the face of the earth, a desolation for beasts to lie down in, was awakened to new life by the spade of the explorer and the penetration of the decipherers. The authentic witnesses of old Assyrian history and culture were freed from their subterranean dungeon, their tongues loosened to living words.

As at the beginning of this century the sepulchres of the Pharaohs had disclosed their secrets, so the palaces of Nineveh, the walls and towers of Babel, arose from the ruins beneath which they had lain buried for more than two thousand years. In the valley of the Euphrates and Tigris, which had watered Paradise, the abode of the first parents of mankind, where the great flood burst forth, where Nimrod founded his first kingdom, where the great Tower of Babel stood, whence the Lord confounded the language of mankind, scattering them abroad over the face of the whole earth, in the home of Abraham, the birth-place of the

chosen people, on the sacred soil of man's earliest traditions, the tireless explorers unearthed extensive records of Nebuchadnezzar and Belshazzar, the account of the Tower of Babel, which the great Babylonian king restored, the annals of Sennacherib, with his campaign against Hezekiah of Judah.

And of Sennacherib's father, Sargon, who led Israel into captivity, monuments still more wonderful were in store for the explorer. Paul Émile Botta, French consul at Mosul, between the years 1842 and 1845, disinterred the entire residence of this great Assyrian king, including temple, observatory, palace with the harem, store-houses, even the bakery and the wine-cellar. From his trenches and tunnels the French archæologist saw himself transported, as by magic, to the magnificent halls whence three thousand years ago half the world was ruled. He beheld the awful figure of the conqueror of Samaria, seated on his throne or standing in his chariot; saw his vassals worshiping before him, saw his exploits in war, his adventures in the chase, his banquets; he walked with the Assyrian gods and in the assembly of their priests, and all that presented itself to his marveling eye was as vivid, as real, as if Sargon's court had been quickened from the dead.

The fruits of these extensive excavations were transported in 1846 to France, where they now ornament the Paris Louvre.

At about the same time Austen Henry Layard uncovered in the mounds of Kouyundjik and Nebi Yunus, opposite Mosul, the site of ancient Nineveh, palaces of Shalmaneser, Tiglathpileser, Sennacherib, Esarhaddon, and Sardanapalus. Countless sculptures and inscriptions, weapons, helmets, trappings, tools, weights, furniture, vases, jewels, objects of bronze and ivory, were brought to light and transferred to the last asylum of so many a lost race, the British Museum, filling there five large galleries; while before Layard's labors a case scarcely 3 feet square inclosed all that remained, not only of the great city, Nineveh, but of Babylon itself.

In 1854 Hormuzd Rassam, working under Layard's directions, discovered in a palace of Sardanapalus, at Nineveh, the greatest treasure of Assyriology, the library of the last Assyrian king; thousands of terra-cotta tablets, inscribed with minute cuneiform characters, containing historical records and chronological statements; letters, dispatches, reports, addresses, and petitions; deeds, bonds, and contracts; hymns, psalms, prayers, songs, and proverbs; lists of gods and their temples; incantations, charms, and omen tablets; lists of countries, cities, rivers, canals, mountains, stars, animals, plants, minerals; grammatical texts, including paradigms, vocabularies, list of characters, exercises in both Assyrian and the language of the primitive inhabitants of the country, the so-called Sumero-Akkadian; mathematical works, calculations, tables of measures of length, of cube and square roots; astronomical observations, calendars—every conceivable branch of literature being represented.

While thirty years ago there was hardly an ancient monarchy shrouded in deeper obscurity than the Mesopotamian Empire, we are now more familiar with the Assyrians than with any other nation of the ancient East.

After Layard's return from Mesopotamia the excavations were continued by Sir Henry Rawlinson, the geologist William Kennet Loftus, and the British vice-consul at Basra, John E. Taylor.

Loftus uncovered the ruins of Warka, the Erech of Nimrod, and Senkereh, the ancient Larsa or Ellassar, whose king, Arioch, was smitten by Abraham in the Vale of Siddim. And in the ancient Babylonian home of Abraham, Ur of the Chaldees, the present Mugheir, John E. Taylor disinterred the great temple of the Moon-God. In the four corners of the sanctuary he discovered four copies of the famous cylinder inscription in which the last king of Babylon, Nabonidus, prays to the Moon-God to fix the awe of his great divinity firmly in the heart of the king's first-born son, Belshazzar, that he may never fall into sin.

But these sites of South Babylonia are still virgin soil; Loftus and Taylor had neither the time nor the necessary assistance to undertake systematic researches. Since 1854, when Taylor spent two weeks at Mugheir, Ur of the Chaldees has not been visited by a single explorer.

While Loftus and Taylor were engaged at Erech and Ur, the French Government sent an expedition to Babylonia under the direction of Fresnel, the architect Thomas, and the young German orientalist, Julius Oppert, at present the most distinguished Assyriologist of France, whose works on the Assyro-Babylonian inscriptions were afterwards rewarded by the great national prize of 20,000 francs, as "the discovery which had brought France the highest honor and the greatest profit." The French expedition remained in Babylonia for three years, making especially a thorough topographical survey of the ruins; but the priceless collection of antiquities, including cylinders, urns, and alabaster vases, statues, gold and silver objects, was sunk in the waters of the Tigris on the 23d of May, 1855, owing to a deplorable accident, or, as others termed it, sheer carelessness and mismanagement, while Julius Oppert pleasantly speaks of these antiquities as "the collection of which the river Tigris has made itself the temporary curator."

New interest was excited in 1872, when the clever young English Assyriologist, George Smith, discovered the cuneiform account of the Deluge. Among the fragments from the library of Sardanapalus treasured up in the British Museum he lighted upon half of a curious terracotta tablet containing the words "the ship rested upon the mountain of Nizir; then I sent forth a dove; the dove went and returned, and finding no resting place, she came back to the ship." He recognized at once that he had found a portion of the Chaldean account of the Flood, and with unwearied patience he set himself to search for the remainder of the story. He succeeded in obtaining quite a number of additional fragments, and made out that the Flood tablet formed the episode of a great

epic of early Chaldea, now generally known by the name of the Babylonian Nimrod Epic, which celebrates in twelve cantos, corresponding with the signs of the zodiac, the exploits of the ancient king of Erech.

The Chaldean account of the Deluge is especially valuable in as much as it proves that the Biblical story of the Flood is the echo of an historical fact. The great geologist, Edward Suess, one of the leading politicians of Vienna, has shown in a special monograph, prepared with my co-operation some years since, that the catastrophe known by the name of the Deluge happened on the Lower Euphrates, involving an extensive and devastating inundation of the lower part of Mesopotamia, the essential cause being a great earthquake in the region of the Persian Gulf, or farther down south, preceded by several slight shocks. And it is very probable that during the period of the heaviest shocks a cyclone moved northward out of the Persian Gulf. Certainly the traditions of other peoples in no way justify the assumption that the Flood extended beyond the regions of the Lower Euphrates and Tigris, let alone that it was a universal inundation.

Smith gave the first translation of the Flood tablet and an account of the Nimrod Epic in a lecture delivered before the London Society of Biblical Archæology on the 3d of December, 1872. His find attracted such widespread attention that the editor-in-chief of the London *Daily Telegraph*, Mr. Edwin Arnold, came forward and offered George Smith a thousand guineas for fresh researches at Nineveh, to recover more of these invaluable tablets. Smith started at once, and his efforts were crowned with success. The first day, immediately after his arrival, he found a new fragment of the Flood tablet, containing the command to build the ark, and not far from it, in the same trench, a piece of the Babylonian account of the Creation. A whole cuneiform series of parallel legends to the early chapters of the first book of Moses was brought to light and given to the world by George Smith in his admirable work, "The Chaldean Account of Genesis."

Twice again Smith went to Assyria. In 1875 he acquired a collection of three thousand clay tablets which Arabs had found in large stone jars near the ruins of Babylon. These stone jars represented the safe of a great Jewish banking house, Egibi & Sons, *i. e.*, Jacob, in Babylonian pronunciation. The business transactions of the Babylonian court had been intrusted to this firm for centuries, ever since the time of Nebuchadnezzar. We see all the various classes, from the highest officer down to the lowest slave, thronging the courts of this great financial establishment, thus unrolling for us a vivid picture of ancient Babylonian life.

When George Smith sojourned in Mesopotamia for the third time he was forced back by an outbreak of the oriental plague at Bagdad. He never returned to his native land. A premature death cut short his brilliant career. On the 19th of August, 1876, he expired, at Aleppo.

After this sad bereavement, keenly felt by all interested in Biblical

research, Hormuzd Rassam, who had assisted Sir Austen Henry Layard at the discovery of Nineveh in 1845, was designated by the British Museum to conduct the excavations.

Since then he has three times revisited the Mesopotamian sites, making new discoveries of great importance. In Nimrud, the site of the ancient Chalah, he excavated a great temple of King Assurnasirpal, the father of Shalmaneser II, and 9 miles northeast of Nineveh he succeeded in disinterring the famous bronze ornaments from the palace gates of Balawat. In the east part of the mound of Balawat he unearthed another temple of King Assurnasirpal. Near the altar was found an alabaster coffer containing two alabaster tablets, a third stone tablet with the same inscription being deposited on the altar. The discovery called forth a tremendous excitement in Mosul and the surrounding villages. Like wild fire the rumor spread that the Mosaic stone tables of the Covenant had been brought to light; just as the Arabs, when the first colossal head of one of the winged bulls was unearthed in 1845, came running to Sir Henry Layard, urging their mares to the top of their speed, and exclaiming: "Hasten, Bey; hasten to the diggers, for they have found Nimrod himself. Wallâb, it is wonderful, but it is true; we have seen him with our own eyes. *Lâ ilâha illâ huwa*; there is no God but He, the living, the eternal." During his last expedition, undertaken in the years 1880-'81 and extending over eighteen months, Rassam discovered the archives of the ancient temple of the Sun-God of Sippar, the Biblical Sepharvaim, one of the oldest Babylonian cities, where the god Ea, or Kronos, bade the Chaldean Noah bury the records of the time before the Flood.

Excavating in the ruins of Sippar, now represented by the site of Abu-Habbah, midway between Babylon and Bagdad, he came across a great square edifice, and beneath the floor of one of the rooms he discovered an alabaster coffer with numerous tablets, one of them containing a curious sculpture representing the Holy of Holies, the Sun-God seated on a magnificent throne ornamented with cherubim, and grasping in his hand a short wand and ring, the symbol of eternity.

Rassam also examined again the palaces of Sennacherib at Nineveh, recovering from the ruined library more than fourteen hundred new terracotta fragments. And in one of the walls of the palace he found a new decagon or clay prism, more than a cubit high, and containing in twelve hundred lines of cuneiform writing the annals of the last great king of Assyria, Sardanapalus. In the northeast corner of the terrace of the tower of Babel he discovered the palace occupied by Nabonidus during the siege of Babylon by Cyrus, and the British Museum subsequently acquired the cuneiform annals of the last Babylonian king, relating to the capture of Babylon by Cyrus and the events which preceded and led to it. Amongst many other things brought by Rassam from the excavations at Babylon, for instance a bronze door-sill whose metal even now represents a value of more than \$400, there was also a clay cylinder of

Cyrus, containing an account of the taking of Babylon, and giving the genealogy of the great king. Sir Henry Rawlinson says that it is perhaps the most interesting cuneiform document that has been yet discovered.

While Rassam was digging in North Babylonia, under the auspices of the British Museum, M. Ernest de Sarzec, the French vice-consul at Basra, near the mouth of the Euphrates and Tigris, found in the ruins of Telloh, on the canal Shatt-el-Hai, a number of colossal statues, four standing and four seated, covered with archaic inscriptions of the ancient Chaldean king Gudea, who reigned about four thousand years B. C. One of the seated figures holds on the knees a diagram with a plan of a city or fortress, and an accurate rule. The collection, which is exceedingly important for the history of early Chaldean art, was purchased for the Louvre at a price of 150,000 francs, and forms a most valuable addition to the Paris antiquities from Mesopotamia.

But since these remarkable discoveries were made all digging on the Mesopotamian sites has practically come to a stop. There is a strong opposition now on the part of the Turkish authorities to archaeological research by agents of European countries. The superintendent of the British excavations himself states that the attitude assumed by the British Government in the Egyptian difficulty has alienated the good feeling of the Sublime Porte towards the English, and the Sultan not caring to grant them any favors, everything has gone against them. And France, as well as the other continental powers, is not able to take up this scientific mission.

Now I should like to ask, is not America called upon to step in here? During the last few years Assyrian studies have made such great progress in this country that the eminent French archæologist and chief-justice of the supreme court of Rouen, M. Joachim Menant, in a recent work reviewing the development of Assyriology, declares that the most serious efforts in this line are concentrated in America. There are more specialists in this branch of Biblical philology here than in England, and I venture to assert that they are not inferior to the English. Harvard, Yale, Columbia, the University of Pennsylvania, Princeton, Johns Hopkins, and other universities, as well as various theological seminaries in New York, Boston, Chicago, Cincinnati, Andover, Newton Centre, etc., recognizing the importance of these investigations, have appointed professors of Assyriology, who have gathered around themselves a band of zealous workers.

It can be confidently stated that if a national expedition, composed of delegates from all these various institutions of learning, enjoying the enlightened protection of the United States Government, and supported by all who take an interest in the history of their religion, could be sent from this country, it would yield excellent results, whose publication in a monumental work, under the auspices of our great national institution for the increase and diffusion of knowledge, would be a lasting

memorial of American scientific enterprise and scholarship. Everything that is necessary for such an undertaking is here—self-denying enthusiasm, facing all dangers; thorough preparation, insuring success—a fertile field for investigation, promising rich results; a magnificent Museum, making accessible to the general public the treasures recovered—everything is here. All we need is a fund.

I trust we shall not have to wait until it is too late. In a few years political complications in the East may render it impossible to recover any of these treasures.

For systematic excavations in the ruins of some ancient Babylonian cities, especially in the home of Abraham, Ur of the Chaldees, the present Mugheir, on the right bank of the Euphrates, near the junction with the canal Shatt-el-Hai, it would be necessary to employ about six hundred Arab laborers, under the supervision of a scientific staff composed of about twelve persons, one-half Assyriological specialists from various American universities and seminaries, and the others, as far as possible, officers of the U. S. Army and Navy, including one or two engineers, a surgeon, an architect, a photographer, and a business manager, who might at the same time act as reporter and paymaster. The expenses of the members of the staff would be about \$5 a day, and the daily wages for the native laborers about 20 cents, so that if the expedition started from Europe about September 1, and conducted systematic excavations in Babylonia for half a year, the total cost of the expedition would be about \$40,000—one-half wages for the diggers, and an equal amount for the expenses of twelve members of the staff, their outfit in clothing, bedding, arms, saddles, etc., the passage to Europe and thence to Beirut, the caravan from Beirut to Bagdad, which would be under way for about fifty days, and finally, six months' stay in Babylonia.

In view of the importance of the undertaking it may be expected that the various institutions represented on the staff of the expedition will defray the personal expenses of their delegates, which would amount to about \$2,000 in each case; so all we need is a fund of \$20,000 for the excavations. If some public-spirited person should feel inclined to present this amount he would be sure of grateful recognition on the part of the whole civilized world. The expedition would go out under his name, and the collection, to be transferred to the National Museum, as well as the great monumental work embodying the results of all the investigations, would forever be distinguished by his name. Every single piece, too, of the thousands of sculptures and inscriptions would be marked and always referred to by scholars all over the world as Y. Z. 1, 2, 3, etc.

I presume very few people in this country are aware what vast business interests are connected with the exploration of Mesopotamia. There is, for instance, the projected Euphrates Valley Railroad, between Alexandretta, on the Mediterranean, and Basra, on the Persian Gulf, a

distance of about 920 miles, the cost of which would be about \$36,000,000; that is, estimated at the high rate of \$40,000 per mile. Sir William Andrew, in a remarkable lecture delivered before the National Club of London in 1882, states that it is not too much to say that no existing or projected railroad can compare in point of interest and importance with that of the Euphrates Valley. It would be the shortest and cheapest route to India, saving about 1,000 miles in the distance between England and India, thus reducing the time occupied by the journey to ten days instead of twenty, and it would tend in a great measure to a peaceful solution of the Eastern question, affording an additional guaranty for the integrity of the Ottoman Empire. It would promote commerce, civilization, and Christianity, the progress, the freedom, and the peace of the world.

The Porte had once promised a guaranty of 6 per cent. on the estimated expenditure, and I dare say the English Government would be willing to give an adequate guaranty at any time. The advances made by Russia in Asia imperatively demand the construction of an alternative route to India. The Suez Canal might easily be rendered useless through a few dynamite explosions, or the sinking of a ship, for months, and perhaps for a year.

The section of the Euphrates Valley Railroad between Bagdad and Alexandretta would pay exceedingly well. There are about ten thousand camels employed now in traffic between Bagdad and Aleppo, and the price of conveying goods at present by camels and mules between Aleppo and Alexandretta is from 15 to 25 cents per ton per mile. The local traffic already existing in the country to be traversed would certainly more than suffice to pay the ordinary interest on this section. The opening of the Euphrates Valley Railroad would be a great step towards a recolonization and recivilization of Mesopotamia, looked upon from the earliest times as among the richest countries in the world. It has recently been shown by a most competent person that Mesopotamia, after a restoration of the famous ancient system of irrigation, on which the whole welfare of the country depends, and a national recultivation of the incredibly fertile soil, might yield an annual revenue of five hundred millions. That is not based on the imagination of an enthusiastic Assyriologist, but on sober calculations. I mention this simply to show that there are other things to be had in Mesopotamia than Biblical antiquities.

The Babylonian expedition might lay the foundation of a national institution similar to the American school at Athens, and we have already a place in the East which would be most appropriate as the permanent headquarters of this American school of Biblical archæology—I mean the American college at Beirut. Thousands of dollars are sent from this country to England every year for the Egypt exploration fund. I can not conceive of any reason why American contributions should go to support explorations under British auspices. If the Amer-

ican representatives of Biblical archaeology found an adequate pecuniary assistance for their national undertaking we could soon have in Washington one of the finest collections of the world.

It has been very cleverly said that archæology is like the giant Antæus in the Greek myth; we develop in strength as often as we come in contact with the ground. I sincerely hope that we shall be able to begin digging at no distant date. People in Europe would hardly believe that we have everything for a national expedition to Mesopotamia save the money. Such a project appeals to every one who takes an interest in the dawn of civilization and the history of religion. The monuments in the valley of the Euphrates and Tigris furnish the key to countless mysteries in the early history of man. They answer a multitude of questions whose solution is indispensable for a study of the development of religion and culture. They add new leaves to the book of man's earliest traditions. They confirm and elucidate the sacred records of the Old Testament. Chaldea is the cradle of the great race of Israel, the birth-place of his ancestors. To Chaldea we can trace the roots of his nationality and his religion, and indirectly the roots of Christianity. If we wish to have some knowledge of the primitive period in which the chosen people developed, we must dig for it in Assyria and Babylonia.

It is true we can not recover gold, as the natives fancy. A treasure of Priam will never be found in the sterile mounds of Mesopotamia. All that we can unearth are sculptures and inscriptions, nothing but stones, broken stones, but stones to which the word of Scripture applies: "If men should hold their peace the stones will cry out."

REPORT ON THE DEPARTMENT OF AMERICAN ABORIGINAL POTTERY IN THE U. S. NATIONAL MUSEUM, 1888.

By WILLIAM H. HOLMES, *Honorary Curator.*

The work of cataloguing and installing the great collection of aboriginal pottery is practically completed; as a consequence little has been done during the past year save to properly care for new accessions. A brief statement of the additions is given below. This list includes all material received by the Museum directly, as well as all collections made by the Bureau of Ethnology.

Through the collections made by the official agents of the Bureau of Ethnology, 509 numbers have been added to the catalogue; through exchanges, 2; through purchase, 304; and through donation, 20.

Four collections of considerable importance have been received by the Bureau of Ethnology and will soon be formally turned over to the Museum. One of these is from the pueblos of Jemez Valley, New Mexico, by James Stevenson; one from the Cherokee and Catawba Indians of North Carolina, by James Mooney; a third from Chiriqui, South America, by J. A. McNeil; and a fourth from Mexico, by Ward Bachelor.

The only researches made by the curator have been a study of the origin and significance of the textile ornament upon the pottery of the eastern United States, and a study made in the field of the relation of the ancient and recent ceramic remains of northern New Mexico. The former paper was read before the Anthropological Society of Washington and will probably be published by the Bureau of Ethnology, and the latter study is not yet ready for presentation.

The last catalogue number of June, 1887, is 132955. The last catalogue number of June, 1888, is 134497.

REPORT ON THE SECTION OF TRANSPORTATION AND ENGINEERING IN THE U. S. NATIONAL MUSEUM, 1888.

By J. ELFRETH WATKINS, *Curator.*

During the first half of the fiscal year, while serving as honorary curator, I was able, through the courtesy of the officials of the Pennsylvania Railroad Company, to spend such time as I could be spared from my duties in their service in the developement of the Section of Steam Transportation. Owing to the limited time at my command little was accomplished. Having become permanently connected with the Museum staff in December, 1887, increased space was assigned to the section at the east end of the east hall, early in January. Shortly afterwards the scope of the section was enlarged, with the designation of the Section of Transportation and Engineering.

It is the aim of the Section of Transportation and Engineering to present an object lesson that shall illustrate and preserve the history of the devices man has used, the structures he has built, and the machines he has invented to promote travel and commerce and to convey intelligence. Appliances used to generate power for manufacture, and to produce heat and light, and others of a similar nature are temporarily assigned to this section.

The science of engineering has been so intimately connected with and interwoven in the development of the art of transportation, especially of late years, that the problems presenting themselves to the projectors of railways and the constructors of steam-ships have evolved several distinct branches of engineering especially devoted to their solution.

Since inventive genius has generally followed in chronological sequence, the system of arrangement to show development step by step which prevails in the other departments of the Museum is particularly applicable to this section.

Early in his existence, doubtless in prehistoric times, man's attention was directed to travel, as he was was compelled to use his intelligence from the beginning to aid him to surmount the obstacles in the journeys which his physical necessities required him to make.

Aboriginal methods of utilizing muscular force (in burden-bearing and human and animal traction) and the power of the wind and wave are placed at the beginning of the series devoted to transportation, of

which the machines and structures devised by the modern engineer to accelerate locomotion and facilitate conveyance are the culmination.

It is believed that in museum administration no similar attempt has previously been made to preserve by monuments the history of the development of the appliances that man's genius has contributed towards the creation of the grand chains of intercommunication, the extension of which, link by link, has exercised so potent an influence in accelerating our national growth, increasing our prosperity, and developing our civilization.

A number of objects which had previously been under the charge of the curator of the Department of Ethnology were transferred to this section early in the year. Among these are: Eskimo skin carrying bags; Indian carrying baskets and meat cases; square cane-seat carrying chair; a Madagascar carrying chair or "filanzana" and a Chinese palanquin made of bamboo; several Indian saddles covered with rawhide; two elegant saddles which formerly belonged to the King of Siam, with bridle and reins; fine saddle presented to the President of the United States by the Tycoon of Japan, 1861, and an elephant saddle (howdah) from India; several dog sledges used by the Eskimo and other northern Indians; sledges from Alaska; a reindeer, sled, and mounted life-size figure of Laplander, from the University of Christiana, Norway; the Red River cart; cart from Siam; caretta or ox-wagon from New Mexico; specimens of harness, lassoes, and lariats made by the Eskimos and other Indians of various tribes, together with fine drosky harness from Russia, harness from Portugal, Mexico, and South America, whips from Hayti, and saddle-bags from Daghistan; snow-shoes of many types; sledges and toboggans.

Among the more important accessions of the year are: A model (full size) of the locomotive "Stourbridge Lion," a gift from the Delaware and Hudson Canal Company. This model of the first locomotive that turned a driving-wheel (August, 1829) on a railroad constructed for traffic on the Western Continent has additional historical value from the fact that it was an important object in the Constitutional Centennial Celebration at Philadelphia in September, 1887, in the series illustrating the progress in the art of transportation during the first century of the nation's existence under the Constitution.

In addition to this valuable model, the Delaware and Hudson Canal Company have also donated four of the original driving-wheel tires, three crank centers, and one of the walking-beams which belonged to the "Stourbridge Lion." It is the intention to place these in proper position on the model as soon as practicable.

Another valuable accession is the original multi-tubular locomotive boiler, constructed by John Stevens, 1825, for his experimental locomotive, which ran for several years (1825-'27) on a circular experimental track at Hoboken, New Jersey, deposited by the authorities of the Stevens Institute, Hoboken, New Jersey.

The largest and most important accession of the year was received from the Baltimore and Ohio Railroad Company, through the kindness of President Spencer and Col. James Randolph, consulting engineer; this deposit consisted of a series of ten models, among them being—

A model (half size) of Peter Cooper's experimental locomotive "Tom Thumb." This locomotive was experimented with on the Baltimore and Ohio Railroad on August 28, 1830, near Baltimore. The tubes in the boiler were made of gun barrels.

A model of the horse-power treadmill car, experimented with on the Baltimore and Ohio Railroad in 1830.

A model of a sail car, experimented with in the summer of 1830 on the Baltimore and Ohio Railroad near Baltimore.

A model (half size) of the Grasshopper locomotive "Arabian." Locomotives of this type were introduced on the Baltimore and Ohio Railroad in 1831, and were in use for many years.

A model of the passenger car designed by Peter Cooper for the Baltimore and Ohio Railroad Company in 1830.

A model of a passenger "stage-body" coach, in use on the Baltimore and Ohio Railroad in 1830, and for several years after it was opened for traffic.

A model of the closed passenger coaches on the Baltimore and Ohio Railroad, which were first put in use in 1831.

Among the relics illustrating progress in the art of track building the following may be noted: An original cast tram rail, from the track from Pen-y-darren Works to Glamorgan Canal, near Aberdare Junction, Wales, upon which Trevithick's first locomotive, to help man, ran in 1804. Gift of J. W. Widdowson, of London, England.

An original long stone sill and strap rail, from Baltimore and Ohio Railroad. Laid in 1829. Gift of Col. James Randolph, consulting engineer, Baltimore and Ohio Railroad Company.

An original stone block and section of rail and joint from the Camden and Amboy Railroad, laid in 1831. Gift of the curator.

A model of the track of the Baltimore and Ohio Railroad with Ω rail, several miles of which were built by that company, 1844-'45. Deposited by the Baltimore and Ohio Railroad Company.

Pennsylvania Railroad standard, 1888 (model), showing standard track, with stone ballast, angle splice-bars, ditches, etc. Gift of the Pennsylvania Railroad Company, through Joseph T. Richards, assistant chief engineer.

The following important accessions illustrating improvements in the appliances for marine propulsion were also received: Original patent, granted to John Fitch, of Philadelphia, Pennsylvania, by Louis XVI, King of France, November 29, 1791, for his inventions for propelling boats by steam. This, the original document, was discovered at the destruction of the Librairie Nationale by the Commune in 1873. It is the gift of John C. Lang, Washington, District of Columbia.

Propeller-wheel (duplicate, exact size) of steam-boat designed and constructed by John Stevens, of Hoboken, New Jersey, 1804, with sketches of boats and machinery. Copied, by permission of the authorities of the Stevens Institute, Hoboken, New Jersey, from the original propeller-wheel preserved in the museum of that institution.

Enlarged photographic copy of contemporaneous lithograph of the steam-ship *Savannah*, the first steam-ship to cross the Atlantic, 1819. As the log of the voyage of this vessel from Savannah (May 22, 1819), under command of Capt. Moses Rogers, to Liverpool (June 20, 1819), is in the collection, this contemporaneous lithograph is of particular value.

The original steam steering-engine (the first ever made) applied to the steamer *Augusta*, 1859, a gift of F. E. Sickie, the inventor, is a most interesting relic.

Contemporaneous lithograph of the *R. F. Stockton*, the first steam-vessel with iron hull or screw-propeller to cross the Atlantic, and a piece of the original iron hull. Gift of the curator.

On the 28th of May I was directed by the Assistant Secretary, in charge U. S. National Museum, to prepare a series of models, drawings, etc., illustrating the history of transportation, for the exposition at Cincinnati, and during the remainder of the fiscal year my attention was entirely devoted to that subject.

A catalogue of the objects forwarded to that exposition will be presented in the next annual report.

The following is a brief outline of the classification adopted:

Class I.—From the Atlantic to the Ohio Valley: Methods adopted by the aborigines and early settlers. This class contained objects of special local interest to the residents of the Ohio Valley and of the old Northwest Territory.

Class II.—Development of the American locomotive: This class was divided into two series. Series No. 1 included only such locomotives as were either built in the United States or imported from England for service on our railroads. The methods of construction of many of the locomotives included in the series of foreign locomotives (No. 2) were, however, closely studied by the early locomotive builders in the United States, who, in some cases, sent representatives abroad to investigate and report upon the locomotives being built there. Many of these reports found their way into the American journals devoted to invention, and in some cases were published in book form, and thus had such important bearing upon the "development of the American locomotive" that a failure to make reference to them would leave the chain of invention deficient in many links.

Class III.—Development of the American passenger car.

Class IV.—Development of the American rail and track.

Class V.—Development of the American steam-boat and modern steam-ship.

Class VI.—Maps showing extensions of railway system in the United States.

Class VII.—Methods of transportation in other countries.

As this is the first attempt in the history of expositions to tell the story of the development, step by step, of our great systems of transportation by series of models, drawings, and relics, the interest manifested in the subject by those to whom I applied for assistance was most gratifying. Had I not received their hearty co-operation little could have been accomplished in the brief time allotted to the task.

The cordial thanks of the Museum are hereby extended to President Spencer and Col. James Randolph, of the Baltimore and Ohio Railroad; to Joseph T. Richards, assistant chief engineer, and W. J. Latta, general agent, Pennsylvania Railroad Company, Philadelphia; to Messrs. Burnham, Parry, Williams & Co., proprietors of the Baldwin Locomotive Works; Harper Bros., New York City; Francis B. Stevens, civil engineer, Hoboken, New Jersey; and Dr. Henry Morton, president of Stevens Institute of Technology, Hoboken, New Jersey, for their assistance.

While the withdrawal of objects from the Museum collection for this exposition will impair the educational value of the series to the visitors of the Museum during the first four months of the next fiscal year, it is hoped that the exhibit made at Cincinnati will stimulate the interest of the people of that region in the subject that has added so largely to their prosperity, so that ultimately the collection will be strengthened by additions from that quarter.

It is believed that when the series now at Cincinnati is returned, and the objects, properly classified, become permanently installed, the Museum will possess a collection of very great historical value.

REPORT ON THE SECTION OF MATERIA MEDICA IN THE U. S. NATIONAL MUSEUM, 1888.

BY JAMES M. FLINT, M. D., U. S. NAVY, *Honorary Curator.*

The former curator of this section, Dr. H. G. Beyer, U. S. Navy, having been ordered to other duty by the Navy Department in October last, the section was left without an official head until April of this year, although the present Curator was requested to look after the interests of the collection during the interregnum, and gave to it a portion of his time. There has been no assistance of any kind in the office since October last, and only the results of the unaided labor of the Curator for a small portion of the year can be presented, and these are naturally not numerous or of great importance.

Few accessions of any importance appear upon the register. A collection of Corean medicines, numbering two hundred and twenty-two specimens, has been obtained by purchase for a nominal sum, and fills out very completely the series of drugs from that country previously received from other sources.

The whole collection has been moved during the year from the west north range of the Museum to the east south range. The transfer made necessary a re-arrangement of the cases to suit the changed conditions, and as a consequence the systematic arrangement of the collection, so far as it existed in the former location, was entirely lost. To restore the classification involved the moving of the thirty-five hundred specimens, most of them more than once.

It was found by experiment that the appearance of the collection could be improved by giving to the interior of the exhibition cases a lighter color than the standard maroon. To this end the cases have all been repainted, involving the necessity of again moving all the specimens twice. Some further transfers are yet necessary to perfect the systematic arrangement of the collection.

In view of the growth of the collection, the variety in points of interest and importance of the individual specimens, and the necessary restrictions as to available space for exhibition, a modification of the former classification has been decided upon. Retaining the general features of classification by natural orders, the whole collection is broken into several series. The first will consist of the more important drugs in gen-

eral use among civilized people, and known as "official" or "pharmacopœal" drugs. These it is proposed to illustrate, as fully as possible in the space allowed, by colored plates, photographs, drawings, etc. Following this fully illustrated series will be presented the indigenous drugs of the United States, not official, with references from the labels to the illustrations, which will be placed in the pillar screens. In this way case room will be saved, at some sacrifice of attractiveness, but not of utility to the intelligent student. The collections, in many instances quite large and interesting, of drugs from Mexico, Chili, India, Japan, Corea, China, and other countries, will be placed in separate geographical series, whereby their ethnological and botanical interest will be increased without any sacrifice of their medical value.

The routine work, begun and to be continued, is the thorough labeling of the collection, giving to every object, whether drug, botanical plate, or diagram, a carefully prepared label.

As at present exhibited the labels are without unity of method in their treatment of the subjects, some of them being very elaborate and technical, the most of them giving scarcely more than the name of the article and the donor. It is proposed to take the specimens in regular order according to the classification, prepare a careful label for each, and take note of desiderata which the investigation may suggest, and thus render whatever work may be done complete and permanent. To obtain specimens seems to be the easiest part of the work, for every large commercial drug-house in this and other countries appears to be ready and anxious to contribute and to make personal effort to obtain what is wanted.

Up to the date of closing this report (June 30, 1888) four hundred and fifty labels have been completed and mounted in type-writer copy for temporary service. A manuscript copy of these labels, with brief explanatory and descriptive notes, has been made for the purpose of publication at some future time, should it be thought desirable. The present state of the collection may be briefly summarized as follows, viz: Number of specimens registered June 30, 1887, 5,516; number of specimens registered during the past year, 245; total, 5,761. Less duplicates and rejected specimens, 500; remaining, 5,261.

REPORT ON THE COLLECTION OF HISTORICAL RELICS, COINS, MEDALS, ETC., IN THE U. S. NATIONAL MUSEUM, 1888.

By A. HOWARD CLARK, *Curator*.

Among the principal accessions of the year is the war saddle of General Grant, deposited by General A. H. Markland. This was used by General Grant in all the battles in which he participated from February, 1862, to April, 1865. It is a valuable addition to the large collection of Grant relics received last year.

From the Bureau of Engraving and Printing was received a series of India proofs, showing the backs and faces of all the current bonds and currency notes issued by the United States, illustrating each denomination of Treasury notes and gold and silver certificates from \$1 to \$10,000, and coupon and registered bonds from \$10 to \$50,000.

One of the most important additions to the collection of national relics was deposited by Mr. Etting (accession 20719). It is one of the thirteen original pamphlets signed by George Washington, John Adams, and other colonial delegates, entitled "Original Association of Congress, October 20, 1774." By this association the delegates pledged the colonies not to import British merchandise after December 1, 1774, and organized committees of correspondence in the several colonies, etc. The pamphlet consists of nine printed pages, with two pages and part of a third containing the autograph signatures of the delegates.

Several collections of ancient and modern coins were received from M. W. Graves, Hartford, Connecticut; Mr. Thomas Wilson, Washington, and others.

A beginning has been made in the exhibit of coins toward illustrating the money of Bible times by showing the coins of kings, countries, and cities mentioned in the Bible, and specimens of the widow's mite, the shekel, denarius, etc.

Many additions have been made to the collection of military decorations, medals, and badges of civic societies, including original decorations of the Order of the Iron Cross of Germany, the Legion of Honor of France, and other European orders.

From Mr. Stephen Vail was received a piece of the original wire, over which one of the very first intelligible telegraphic messages was transmitted during the experiments by Professor Morse with his telegraph

instrument at the Speedwell Iron Works, New Jersey, about the year 1840.

From the widow of Professor Baird was received a valuable collection of nearly eighteen hundred foreign and American postage-stamps, gathered by Professor Baird.

The Ordnance Department, U. S. Army, transferred to the National Museum a number of interesting war relics, including a large section of an oak tree riddled with bullets, from the battle field at Appomattox Court House.

To the collection of autograph letters and documents were added commissions signed by each of the Presidents of the United States, and deeds and letters, with autographs, of many eminent men.

To the Washington collection was added the original plaster model of the bronze statue of Washington, designed by William Rudolf O'Donovan in 1887, erected at Washington's headquarters, Newburgh, New York, according to act of Congress of June, 1886. The attitude is commemorative of Peace, representing Washington in the act of sheathing his sword at the close of the Revolutionary War. Accompanying the statue is the certificate of the sculptor, in which he says: "This statue is the size of life, and in the matter of facts of proportion is correct, having the small head, the long body, the narrow shoulders, and broad hips of the three full-length portraits by Trumbull and of the statue by Houdon in the State-house at Richmond. The head is from the life cast made by Houdon at Mount Vernon in 1785, which has been little known to artists and not at all to the public until within the last ten years, and has not been used, save by Mr. O'Donovan in the making of this statue."

The Smithsonian Institution during the year transferred to the Museum its collection of portraits of American and foreign scientists and men prominent in political or civil life. This series includes nearly twenty-five hundred engravings and photographs, and will be a valuable nucleus for the formation of a national gallery of portraits of representative men.

A pair of silver-mounted flint-lock pistols, once the property of General Lafayette, have been deposited by Mr. William Burnett.

Last catalogue entry in June, 1887, 125335; first catalogue entry in fiscal year beginning July 1, 1887, 125336; last catalogue entry in June, 1888, 125887; total number of entries, 552, representing 1,016 specimens; there are about 2,000 specimens on hand not catalogued.

STATEMENT RELATING TO THE COLLECTION ILLUSTRATING THE GRAPHIC ARTS IN THE U. S. NATIONAL MUSEUM. 1888.

No formal report upon the work accomplished in connection with the collection illustrating the graphic arts, under the care of Mr. S. R. Koehler, has as yet been published. The following letters are placed on record to call attention to an important contribution, received from Mr. J. W. Osborne, of Washington. Mr. Osborne is the inventor of one of the processes of photolithography, still in general use, patented by him in 1859, and he has since that time been familiar with every step of progress in this department of the graphic arts.

Letter from J. W. Osborne transferring to the National Museum his collection of proofs and specimens illustrating the development of photo-mechanical printing.

212 DELAWARE AVENUE, NORTHEAST,
Washington, D. C., June 6, 1888.

DEAR SIR: Two or three years ago I told you of my wish to give the U. S. National Museum the collection of proofs and specimens illustrating the development of photo-mechanical printing, which was the result of my long practical experience and observation of the several processes comprised under that term, and of my knowledge of the men who practiced them. This earnest intention I have now carried out in forwarding to the Museum last Friday a large box and seven other packages containing my whole collection and addressed to the care of Mr. S. R. Koehler, curator of the section of graphic arts.

Mr. Koehler and I have spent many days in going over the numerous specimens and have arranged them according to a crude classification, which must be reconsidered with much more care and judgment before they are fit for public inspection. All the important and typical processes are represented in this collection by many examples, and it is my wish that Mr. Koehler should divide the whole into two parts; one for the U. S. National Museum here and one for the Art Museum in Boston, to which institution I intend then to give it. For this purpose the number of specimens I have accumulated is, generally speaking, amply sufficient; but I desire in all cases where a process is represented by a single print, or where a choice has to be made between a good and bad example of some person's work, or where the completeness of a series requires it to be kept unbroken, that the advantage be always given in favor of the Washington collection. After this division has been made there will still remain in very many cases a large number of duplicate copies, which may accompany each collection. These may well be employed, when opportunity offers, for the purpose of effecting exchanges with other persons possessing valuable specimens, so as to increase and perfect the historical presentation here and in Boston. I request that prints so given to other collectors or museums may be marked in some way indicating that they were originally donated by me.

Of the general character of the photo-mechanical work in this collection, it may be said that photolithography is more fully represented than any other of the photo-processes classed with it, and that most of the specimens of all kinds will be found to belong to a period extending from 1852 to about 1872. Photolithography predominates for the reason that there was much more of it done in the years indicated than of intaglio or relief work, the two latter not having reached a condition of commercial importance till after 1872.

In this letter it would be unwise to attempt a full citation of the processes represented, experimental and practical, in the collection I have made, but a few of the names of leading inventors and process-workers may be given with advantage, as follows:

Lemercier, Barreswill, Lerebours and Davanne, 1852; Macpherson (?), 1852; Fox Talbot, 1853; Paul Pretsch, 1854; Poitevin, 1855; Cutting & Bradford, 1858; Pouncy, 1858; Asser, 1859; Osborne, 1859; Lemercier, 1859; Col. James, 1860; Turner, 1861; Burchard, 1862; Rehn, 1862; Pouncy, 1863; Ramage, 1863; Toovey, 1863; Osborne, 1863; Korn, 1863; Mandel, 1863; Swan, 1864; Dallas, 1864; Egloffstein, 1865; Leggo, 1865; Osborne, 1866; Willis, 1866; Korn, 1866; Henry, 1867; Woodbury, 1868; Eidlitz, 1868; Rehn, 1870; Bierstadt, 1871; Edwards, 1872; Wenderoth, 1872; Leggo, 1873; Bien, 1874; Moss, 1880; Roche, 1881; Ives, 1881; Meisenbach, 1883; Sprague, 1884, and many others of lesser note.

In this citation of persons who have played a part in the development of photo-mechanical processes several names appear more than once; that being done to indicate that at different epochs their influence has been felt in the progress of those arts. The above names, moreover, comprise most of those represented in the collection, but not all those who did important and progressive work; as, for instance, Tessié du Motay and Marechal, and some of their followers; also, some of the more recent operators in intaglio and in relief. I should also add, that some of the inventions named have been more closely connected with carbon printing than with those applications of photography having for their final object the production of impressions from a printing press. This is not easily avoided, because of the close relation which exists between processes belonging to either class, from a chemical point of view. In this connection I will also state, that my specimens of carbon photography have not been included with the photo-mechanical work already sent you, but they are at your disposal whenever you are ready to receive them.

The following very concise and meager statement of my own immediate connection with photo-mechanical work may have some value, and I append it in lieu, for the present, of something more explicit which doubtless ought to be written.

In Melbourne, Victoria, in the winter months (May, June, and July) of 1859, being then an assistant in the magnetic observatory, I was detailed to make certain photographic experiments for the surveyor-general of the colony, Mr. Ligar. His strong determination was to engrave all the published maps, for the sale of land and other purposes, on steel by the help of photography. My efforts for him (following Fox Talbot) did not give results of any value. On the 19th of August of that year, despite Mr. Ligar's objection to stone as a crude material, I invented the photolithographic process, which since then has been known by my name. On the 1st of September, 1859, application was made for a patent, which was granted in due course; and on the 5th of November following the first photolithographic map for public sale was published by the department of lands and survey. From that time to the present my process has been used in Victoria without intermission for all the work which could possibly be brought within its scope, the maps so produced amounting to many thousands. On the 29th of November, 1859, I read a paper discussing specifically what I had done at a meeting of the Philosophical Society of Victoria, which was published in its transactions. In 1862, with leave of absence for twelve months, I returned to Great Britain to visit the Exhibition of that year in London. Then, having resigned my position in the Victorian civil service, I went in 1863 to Germany to study litho-

graphy in its most perfect form. In Berlin, at the establishment of W. Korn & Co., I worked and taught my process for fourteen months. In 1863 it was adopted by the Prussian Government for the production from original pen-drawings by A. Berg of an important official work on the Prussian expedition to Japan, China, and Siam.

My next change of locality was to the United States, landing in Boston from Liverpool in August, 1864. In 1866, under the laws of the State of New York, the American Photolithographic Company was formed; Sydney H. Gay, president. In the autumn of that year practical operations were commenced in Brooklyn; Ezra Cornell, president. In 1869 that company, at the request of Commissioner of Patents Fisher, but at its own cost, reproduced the whole of one month's current work for the U. S. Patent Office, comprising about 1,900 drawings, and printed ten copies of each. As superintendent I advised this, to prove conclusively that the process worked by the company was fit for so large and unusual an undertaking. The effort was quite successful and admitted to be so, but it was not until July, 1871, that photolithographic reproductions of all the current work in the Patent Office were attempted and executed up to date. That contract we got and held for three years, furnishing each week the work done in that week, and printing besides the illustrations for the weekly Official Gazette. An undertaking of such magnitude and difficulty had never been attempted in the history of the graphic arts, and at the time was thought by many to be impossible; it certainly marked an epoch, and is therefore worth noting. For the last twelve or thirteen years I have not been officially connected with the American Photolithographic Company, and need not follow its fortunes further. The United States patents, too, under which it worked, have long ago expired, and my process is used by many as I practiced it, or in a more or less modified form, for transfer to stone, or to zinc when the latter is to be etched into relief for the type press.

The foregoing statement is necessarily very personal in its nature, but it will serve to indicate something of the inducements and opportunities affecting my study of the photo-mechanical arts, and to fix certain dates and a few other facts. Of my knowledge of other workers in this field, of whom many were known to me; of my estimate of other processes and their relation and relative value one to the other; in short of any collateral matter whatsoever calculated to give the subject vital interest I can say nothing that would not extend this letter to an inexcusable length.

Besides the photo-mechanical specimens which I have given the Museum, the collection contains a few lithographic plates by such artists as Menzel, Feckert, Jensen, etc., which will find an honorable place in the section of graphic arts.

Let me now express the pleasure it gives me to have put at last into such excellent keeping a collection so difficult to get and preserve; one which has cost so much labor, and which will remain so replete with instruction for those who wish to follow the wonderful development of the graphic arts within the last fifty years. I look forward with the greatest interest and expectation to Mr. Koehler's classification and arrangement of the whole, knowing how well his experience, thoroughness, and impartiality fit him for the work, and I rest confident in the belief that in your appreciative care this collection will increase still further, and will be always a valuable and accessible help to other men striving to advance.

Yours truly,

J. W. OSBORNE.

Prof. G. BROWN GOODE,

Assistant Secretary Smithsonian Institution,

In charge of U. S. National Museum,

Washington, D. C.

Letter from Dr. G. Brown Goode, acknowledging the receipt of Mr. J. W. Osborne's collection illustrating the development of photo-mechanical printing.

SMITHSONIAN INSTITUTION,
OFFICE OF ASSISTANT SECRETARY,
IN CHARGE OF U. S. NATIONAL MUSEUM,
Washington, June 12, 1888.

DEAR SIR: Your collection of proofs and specimens illustrating the development of photo-mechanical printing has been received. The boxes and packages have been placed in the work-room of one of our preparators, where it awaits Mr. Koehler's return to Washington.

We are very glad to have the active co-operation of one who has done original work in this direction. It is by such generous assistance that the National Museum has been enabled to make such rapid strides during the past five or six years. I hope that when your collection has been arranged you will be pleased with our methods of installation. Mr. Koehler has our fullest confidence in all matters of that kind.

I have no doubt that you will hear from Mr. Koehler before he unpacks the boxes. I have sent him a copy of your letter and have called his attention particularly to what you say in regard to sending a portion of the collection to the Art Museum in Boston. I doubt not, however, that you have already explained your wishes to him.

Assuring you of the hearty thanks of the Smithsonian Institution for your generous and most acceptable contribution to the national collections, I am yours very respectfully,

G. BROWN GOODE,
Assistant Secretary.

J. W. OSBORNE, Esq.,
212 Delaware Avenue, Northeast, Washington.

Letter from J. W. Osborne, calling attention to the foundation which has been laid in the National Museum for a collection illustrating the processes employed in photo-mechanical printing.

212 DELAWARE AVENUE, NORTHEAST,
Washington, D. C., October 25, 1888.

DEAR SIR: Herewith I send you copies of two letters which will interest those of your readers who have given their attention to photography and its applications to mechanical printing processes. The first of these letters I may supplement at once by saying that additional collections of mine have since its date been added to the specimens I then sent to the National Museum. Besides photo-mechanical work these include photography, especially early carbon printing, as well as many specimens by processes in which photography plays no part.

My chief object in asking you to publish this correspondence (that course being the shortest and most direct way of presenting the whole matter) is to bring to the notice of experimenters, inventors, and collectors of graphic work, the important fact, that a substantial foundation has been laid for an exhaustive collection of such productions under Government auspices in Washington.

In the National Museum the exhibit made by the section of graphic arts, as presented for public inspection and study, does not as yet include photo-mechanical processes; for there has not been time to effect a satisfactory classification and exposition of my collection. Thorough analysis of that sort is indispensable in such a case, and it always gives rise to much laborious research and comparison of dates and statements in the literary record. At present the section of graphic arts embraces drawing in several styles; etching on metal plates; engraving of different kinds, for the production of both intaglio and relief plates and blocks; lithography in various manners; color-printing; and finally, electrotyping and stereotyping, as applied to graphic multiplication. Besides the printed results flowing from the practice of these

arts (many of great beauty), all the necessary tools and appliances are shown which are required in working the same, with explanatory matter in the form of labels and printed statements.

This collection, though it covers much space and will strike every one as most instructive, is yet to be regarded as a nucleus only, about which the full display will continuously grow toward completion. As planned, we shall have in this Department in a few years a collection representing every known process, perfect in classification and in chronological arrangement, and accompanied throughout by explanatory matter which will give to every specimen a historical as well as a scientific interest.

In this country there are many persons possessed of early results from drawn and engraved surfaces, with or without photographic aid. These are sometimes artistic in their nature, and sometimes they indicate only an earnest striving in that direction. But they are all valuable historically or technically, and should be preserved in such a way as to turn them to the best account. As a rule this can only be done by placing them in a public institution under the direction of persons whose knowledge and experience insures a good estimate of their importance and of their proper place in a classified collection. For such reasons I would urge those of my fellow-workers in this field who have collections, for the disposition of which no definite arrangements have been made, to communicate with Prof. G. Brown Goode, with a view of donating the same to the National Museum. By taking this course, a permanent, I might say an ever-increasing, value will be given to what might in time pass into the possession of unappreciative persons who cared little for the landmarks of progress or the work it cost to reach them.

In my letter to Professor Goode a number of dates are given, some slight corrections in which (not inserted) I have already made. These dates relate occasionally to the time when certain inventions were made, but more generally to the time when specimens of work in my collection were produced by inventors and other persons of note. I am very anxious to be correct on the subject of priority, and if it should be in the power of any of your readers to question the accuracy of these dates or qualify them in any way, and they will do so by letter addressed to me at Washington, I shall be very much obliged.

Yours truly,

J. W. OSBORNE.

THE EDITOR OF THE AMERICAN LITHOGRAPHER AND PRINTER,

12 Centre Street, New York.

In addition it may be stated that since these letters were written the collection of specimens illustrating the photo-mechanical processes has received many accessions, principally by gift, including a number of collographic prints by Tessié du Motay (mentioned above as not represented in the Osborne collection), received from Mr. William Kurtz, of New York, and a very complete illustration of the original Ives process, including not only specimens but also models of machinery, presented by the inventor himself. These, with a selection of specimens of great historical importance, selected from the Osborne collection, and the generous donations of later work by firms at present actively engaged in the United States in the commercial exploitation of the various photo-mechanical processes, are about to be placed on exhibition, and when the collection of patents granted to inventors in this department of applied science, which is now being made with the aid of Mr. J. W. Osborne, shall have been completed, the U. S. National Museum will find itself in the possession of a collection elucidating the history and practice of photo-mechanical processes, unrivaled by any other collection of the kind at present known to exist.

REPORT ON THE DEPARTMENT OF PREHISTORIC ANTHROPOLOGY IN THE U. S. NATIONAL MUSEUM, 1888.

By THOMAS WILSON, *Curator.*

Dr. Charles Rau, for many years the curator of this department, entered the service of the Smithsonian Institution in 1875, and was placed in charge of the preparation of an ethnological exhibit for the Centennial Exhibition in 1876, and he was subsequently appointed Curator of the Department of Archaeology in the National Museum. Dr. Rau had been in poor health during the winter of 1886-'87 and had partially recovered, but was suddenly attacked in July and went to the hospital of the University of Pennsylvania, where he died on July 25, from the effects of a surgical operation. His body was interred in Oak Hill Cemetery, Washington, where a modest stone, bearing a suitable inscription, has been erected to his memory.

Dr. Rau bequeathed to the National Museum his library, consisting of 715 bound volumes, and 1,722 volumes unbound, his archæologic and ethnologic collections, comprising 2,000 specimens, and his collection of minerals and fossils.

The books comprising the library are now being arranged and catalogued, and will form the nucleus of a sectional library in the Department. The archæologic specimens will, so far as possible, be kept together and displayed under the name of their donor.

Almost the entire life of Dr. Rau was spent in archæologic studies. He was faithful, zealous, and devoted to his science.

At the time of his death Dr. Rau was engaged in the preparation of a work which he had called "The Typical Forms of North American Prehistoric Relics of Stone and Copper in the U. S. National Museum." This was intended by him to be an enlargement of his work "Archæologic Collections of U. S. National Museum," and published April, 1876, as Smithsonian Contributions to Knowledge, 287, the edition of which had been exhausted. It was to have been followed by a larger and more complete work which, with its illustrations, should represent the entire field of American Prehistoric Anthropology. This he intended to be the *magnum opus* of his life.

The line upon which the work left by Dr. Rau proceeded during his life-time has not been changed except in some details. It seems de-

sirable, however, to extend somewhat the scope of the work, and to attempt the preparation of but one volume instead of two. Mr. Wilson, the present curator, has taken up the work of the Department where it was left by the death of Dr. Rau, and proposes to complete the literary work which his predecessor had on hand. That work when completed and published will stand as a catalogue of the objects in this department of the Museum, a work for which there is great need and almost constant demand.

The existence of man on the American continent, especially in the United States, during the paleolithic period of the Stone Age has for many years attracted the attention and excited the interest of prehistoric anthropologists in Europe as well as in America. Dr. Rau had promised himself to give it his serious attention as soon as he should complete the work he had then in hand. His death prevented his carrying out this intention. The need for it was pressing, and the discovery of paleolithic implements in great numbers in the immediate neighborhood of Washington City seemed to present an opportunity not to be neglected.

Special investigations were begun, studies were made in the field, local archaeologists were asked to assist, to which they responded with alacrity. A result of all this was the issuance by the Secretary of the Smithsonian Institution of Circular 36, which appealed to the archaeologists of the various localities of the United States to give such information concerning the paleolithic implements, their existence, plenteousness, and geographic distribution as they might be able. This circular was issued in January, 1888, and the first response was received on February 6. The names and addresses were obtained principally from our own books, supplementing them with such museums and collections as might be publicly known. Up to the 30th of June there had been received two hundred and nine responses. A paper discussing fully the objects of this circular and the information received in reply is published in Section III of this report.

GENERAL REVIEW OF THE YEAR'S WORK.

From the middle of February until the 1st of June the entire office, after the current daily work required, devoted itself almost exclusively to the answers to Circular 36 and the replies thereto, and the further necessary correspondence engendered thereby, and also to the arranging, cataloguing, and assorting the paleolithic implements received.

The outcome of this office work has established the fact of the general distribution of these paleolithic implements over the United States, and, consequently, the existence of a paleolithic period on this continent. It at least establishes the existence and general distribution in America of a civilization closely corresponding to that of the earlier paleolithic period in Europe.

Without stopping to argue or demonstrate the truth of this conclu-

sion or to enlarge upon its importance, we may safely felicitate ourselves that our labors in this direction have been of substantial benefit in the world of American prehistoric anthropology, and that as a result of these labors the year 1888 will hereafter be reckoned as the date when the existence of a paleolithic period in America and the occupation of our continent by man during that period was definitely established.

In addition to the foregoing work I have been employed in the preparation of the descriptive catalogue heretofore mentioned, of which I have now a pile of manuscript, cuts, and photographs 6 or 7 inches in height.

From the 1st of June to the 30th, and continuing into the present year, the force of the office has, after the current business, been occupied with the preparation, arrangement, and installation of the prehistoric exhibit at the Cincinnati Centennial Exposition.

The number of accessions to the collections of this department during the year has been 109. The number of specimens received has been 6,972; specimens sent in exchange, 821; net increase of specimens, 6,151.

The principal accession (No. 19931) was the archaeological collection of Dr. Rau, bequeathed by him to the U. S. National Museum. He had been an enthusiastic archæologist and this was the collection of his life-time. He added nothing to his private collection after his appointment as curator in this department. He bequeathed the following objects:

Four hundred and seventy-four European (137071-137546), prehistoric; thirteen hundred and sixty-seven North American (137618-138984), prehistoric, and eighty-nine of our modern Indian. The European objects he had procured by exchange; the Indian objects were for the most part those which he had procured either directly from the Indians or from persons who had so received them. But the thirteen hundred and sixty-seven North American prehistoric objects were for the most part his own finds and the direct result of his own investigations in the field. Some of his specimens were considered by him to be new forms, those not theretofore known, and upon which he placed a correspondingly high value. A spear-point, now displayed in the synoptical exhibit, from Washington County, Missouri, is of rose quartz. The beauty of its material and the elegance of its workmanship caused it to be prized highly by Dr. Rau, and it may be justly regarded as one of the finest of its kind.

During the year many accessions of paleolithic implements were received in answer to Circular 36. The greater number of these consisted of only a few specimens, but they aggregated a great number. Among the accessions the following are of sufficient importance to justify special mention:

Mr. Elmer R. Reynolds, of Washington City, sent (accession 20497, Catalogue Nos. 139401-139412) two hundred and fifty-nine specimens, of

which two hundred and seventeen were paleolithic, all from the District of Columbia.

Mr. S. V. Proudfit, of Washington City, sent (accession 20003, Catalogue Nos. 137060-137070) sixty-seven specimens, of which fifty-three were paleolithic, and (accession 20358, Catalogue Nos. 139244-139289) one hundred and thirty-one arrow and spear heads. All these specimens were from the District of Columbia, and were intended by their donor to constitute a series which would represent all forms of chipped flint implements from this neighborhood.

Mr. Ernest Shoemaker, of Washington City, sent (accession 20175, Catalogue Nos. 139007-134010) thirty-five specimens, the greater part of which were of the paleolithic type, from the District of Columbia.

The curator has, during the past year, assisted by Professors Gilbert, McGee, and Holmes, and Messrs. Henshaw and Gill, of the U. S. Geological Survey, found in the neighborhood of Washington, principally on the hills and bluffs of Rock Creek and Piney Branch, a great number of paleolithic implements. The accession is 20034 (Catalogue Nos. 137551-137583) and consists of two hundred and ninety-nine specimens.

Prof. G. H. Perkins, of the University of Vermont, Burlington, sent three collections (accessions 20554, 20734, 20878, Catalogue Nos. 139428-139429, 139659-139666, 139724-139730), one hundred and fourteen specimens, principally paleolithic, from northern Vermont.

Mr. Edward Lovett, West Burton House, Outram Road, Croydon, England, sent, by accessions 18743, 20116, 20225 (Catalogue Nos. 139056-139100, 139101-139125, 139126-139149), a collection of two hundred and ninety-nine specimens, sixteen paleolithic. The collection comprises implements and objects from England, Scotland, Ireland, and India. There were small arrow-heads from Arabia, large fragments of Samian ware belonging to the epoch of Roman occupation in England and there lately discovered, many specimens illustrating flint flaking and the mode of fabrication of gun-flints.

Mr. William Ransom, of Fairfield, Hitchin, England, sent (accession 20668, Catalogue Nos. 139466-139488) twenty-eight specimens, of which eight were paleolithic, from England; neolithic implements from Norway and Sweden, and fragments of Samian ware belonging to the Roman epoch, from the city of London, found 10 to 20 feet below the surface.

Another accession (21181, Catalogue No. 139817) which may prove of importance is a flint implement of the rudest type, being merely chipped to a point, or with an edge not more than an inch in width, which was discovered by Mr. William Taylor, of San Diego, Tex., in San Diego Creek, one-half mile from the town of San Diego. It was found by him 3 or 4 or more feet under the surface in undisturbed layers. Mr. Taylor has found several other implements of the same kind, showing that this was not a solitary or isolated case. This implement becomes important

from the fact that it was found near the top of the equus beds of that district, which have become celebrated in the paleontology and geology of our country. The *Mylodon*, *Glypdoton*, *Elephas*, and three species of *Equus*, all extinct animals, have been found fossilized in these beds, and it seems agreed among scientists that these beds belonged to the Tertiary geologic period.

Dr. Edward Palmer has brought in an interesting collection from a prehistoric cavern in the Bay of Angeles, 200 miles northwest from Guaymas, Lower California. (Accession 20608, Catalogue Nos. 139533-139621.)

Dr. Palmer sailed in December, 1887, from the port of Guaymas, Sonora, for the station of the Gulf Gold Mining Company, established in the Bay of Angeles, inside the island of that name, in the Gulf of California and on the peninsula. In the immediate neighborhood of this station he found a natural cave in the granite rock on the coast facing the Bay of Angeles, looking eastward and about 30 feet above the sea level. Débris had fallen so as to make the approach easy, and had filled so as to make a large platform in front of the cave. Here were strewn fragments of rock fallen from the cliff, some of which had been used to wall up the mouth of the cave. A fine spring (laid down in the charts) was just below the cave. The miners of the Gulf Gold Mining Company had visited this spring, and seeing the wall at the mouth of the cave had pried out some of the stones. Digging with their *palletos* (alpen stocks) they had exhumed some of the skulls, which were left exposed to the air. This accounts for some being white. Thus Dr. Palmer discovered the cave.

It was a prehistoric burial place and nothing more. When cleared it was 6 feet wide and 5 feet high at the mouth, 9 feet deep, retreating and narrowing to its farther end. There were seven skeletons in all.

No. 139533 was the bottom layer, made of rushes which were joined and sewed together. We have three bundles. These were apparently spread out to receive the corpses, the bones having been found thereon. The skeletons were extended and the bones all in natural condition and undisturbed, except the skulls dug out by the miners. The burial place was evidently virgin.

The bodies had been put in head first, for they were now with their feet toward the mouth of the cave.

In immediate contact with the skulls, as though they had been used as coverings, were found the nets, three in number. Catalogue No. 139534. (For description and use of these nets as head coverings by the aborigines see Venaga's History of Lower California.)

No. 139535 is a girdle or sort of netted kilt made of twine for one side and fiber bound in strips or bundles, say one-half an inch thick and 8 or 9 inches long, for the other; the whole is covered with feathers.

No. 139536 is a woven belt 15 inches long and 3 inches wide, narrowed at the ends to a single cord; seemed to have passed around the waist and over all, possibly only in front.

No. 139537 is a piece of cloth which would seem to have been the foundation of the kilt, possibly on one (the front) side only.

The last three numbers seem to have a covering of feathers.

No. 139538 was another dress or apron in the same style, but made of strands of human hair. They were cylindrical at the top, about one-fourth of an inch thick, and 10 inches long. The strands were plaited or fastened together at the top so as to make a screen, one side thereof being covered as before with feathers. No. 139539 is another apron of like manufacture with differences in the binding of the hair at the top. Some had small shells strung and woven in.

Nos. 139540, 139541, and 139542 were pieces of fiber, six strands woven together with five cross-ties, the whole 14 inches long, $2\frac{1}{2}$ wide, but doubled in the center to 7 inches—probably worn under the breech clout.

Nos. 139543 and 139544 were bunches of fiber twisted and matted, showing different knots and methods of fastening. There are many specimens of cord showing all manners of twisting, braiding, and knotting.

Nos. 139545 to 139550 are two human vertebrae found closely associated with the following ornaments: Small shells strung together as beads; eight pins—spines of cactus; one piece of buckskin, tied; two sticks, bound; string of corded, plaited, and bound pendants of human hair, cylindrical, one-fourth inch diameter and three-fourths inch long.

The graves were found to contain an entire paraphernalia. Two arrow flakers with points of bone set in handles of wood; four wooden pieces from 4 to 9 inches long, one-eighth to three eighths in diameter, each bound with twine about the body, apparently for a handle, but leaving the sharp point bare; one mush stick; bone points; four shells—(*Cardium elatum*, Sby., and one *Pecten (Vola) dentata*, Sby., possibly used as drinking cups; two stone tubes, drilled lengthwise, one $11\frac{1}{2}$ inches long and one $3\frac{1}{4}$, $1\frac{1}{8}$ to $1\frac{1}{8}$ in diameter.

There was one bow, in two pieces; an arrow of cane or reed, 2 feet 10 inches long, three-eighths of an inch in diameter, with a fish spine for a point 4 inches long. There were two shafts or darts, both with long, sharp points 15 and 20 inches long, one-fourth of an inch in diameter.

Two whistles of hollow reed 9 inches long, five-eighths of an inch in diameter.

A curious implement, use unknown, was a piece of flat wood $9\frac{1}{4}$ inches long, 2 inches wide, and one-eighth or one-fourth thick. One end was a concave with a hole below. About $2\frac{1}{2}$ inches from each end was a single row of very small shells, *Olivella biplicata* Sby., say one-eighth inch, set like marquetry across the flat side and fastened with cement or bitumen.

We have six skulls adult and the fragments of one or more infants.

No. 139551 is one shell ornament, $1\frac{7}{8}$ inches in diameter; perforated as for suspension.



FLINT IMPLEMENT OF HUMAN MANUFACTURE, FROM THE EQUUS BEDS OF THE TERTIARY GEOLOGIC PERIOD, SAN DIEGO, TEXAS.

(Cat. No. 139817, U. S. N. M. Collected by William Taylor.)





FLINT IMPLEMENT OF HUMAN MANUFACTURE, FROM THE EQUUS BEDS OF THE TERTIARY GEOLOGIC PERIOD, SAN DIEGO, TEXAS.

(Cat. No. 139817, U. S. N. M. Collected by William Taylor.)

No. 139552, same, oval, 2 by $1\frac{3}{4}$ inches.

No. 139553, one of the same, $1\frac{1}{2}$ inches in diameter. This specimen is broken in the middle, cracked in two, and has been repaired by four holes drilled in it in pairs, each two opposite, one of which contains the original mending. When the hole of suspension in this specimen was broken out at the edge the owner had reversed the specimen and drilled another hole.

These three ornaments have the appearance of having been used as ear pendants. The shell portion is nearly flat and retains its iridescence. These pieces of shell belong to the species *Haliotis splendens* Rve.

A collection of objects belonging to prehistoric man, three hundred and twenty-four in number, were received (accession 19,249) from Mr. James F. Johnson, Holywood, County Down, Ireland. Mr. Johnson in his communication gives an elaborate description of their discovery, with their position, locality, and association. A new road was in course of construction during August, 1885, on the town land of Ballymenoch, in his neighborhood, County Down, Ireland. He supervised the work. As the men cut through a mound of sand a cave 20 feet long by 3 feet wide and about 3 feet high was exposed which led to an oval chamber 14 by $7\frac{1}{2}$ by 6 feet high. At its farther end, and to the right, another passage leads to a second chamber 9 by 6 by 6 feet high. (Fig. 1.)

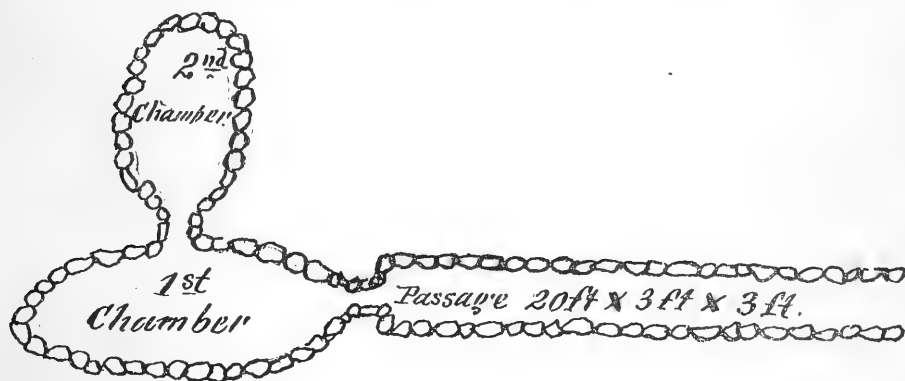


FIG. 1.

It was evidently an ancient habitation of man. It was constructed of boulder stones rudely piled into a wall and arched over as indicated in the section, the whole being embedded in the sand and covered by the mound. (Fig. 2.) In this cavern he found the following variety of implements or weapons (the numbers are from the Museum Catalogue), rude axes (136898), celts (136899), wedge, double celts (136900, 136901), and what he calls a stone lamp, though possibly a mortar (136879), seven

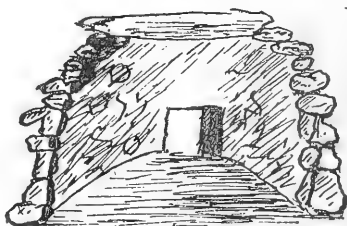


FIG. 2.—Section.

spear and lance heads (136881), fourteen arrow or lance heads (136880), pounding or crushing stones (136888-136897), one shell necklet, and a few other relics.

About 20 feet from the cavern a cutting 9 feet in depth was commenced through what appeared to have been an ancient pond, the deposit being fine mud washed from the hills. All through this deposit were found weapons and tools, all of a rude type, made from the local rock (Lower Silurian), and a few arrow-tips of flint (nodules of which were found from time to time in the boulder clay). In two places were ancient remains of fire. The pond was about 110 by 90 feet with 9 feet only of depth cut through.

From this place he obtained what he names rude hammer-stones (136887-136889), polishing stones (136890-136896), pounding or crushing stones (136878, 136903-136907), rude axes more or less notched (136882, 136898-136899, 136877), rude lance, spear, and arrow heads (136880-136881). In October and November, 1885, he excavated part of a large cavern at Craigavard, County Down. This he believes to be one of the largest artificial caverns in the north of Ireland which has served as a habitation of the prehistoric man. He believes it to comprise no less than twelve separate chambers. Among the common people this was called the Smugglers' Cave, on account of its supposed use by people pursuing that branch of business. He found in this cave whistles, needles, awls, bodkins, all made of bone, and over two hundred teeth (136880, 136881), and a quantity of splintered animal bones (136884). In chamber number 4 he came, at a depth of 2 feet, to the ancient floor, which consisted of river gravels thrown over the boulder clay. On this floor he found a few rude implements of the same type as from Ballymenoch.

He made excavations in the raised beaches of the neighborhood, and found many implements which he considers modern compared with those from the two caves mentioned. The implements from the caves are made, as he says, from the Lower Silurian and other rocks, while those from the raised beaches are of flint. The cave implements are found at high elevations, but never in raised beach gravel. This he thinks to be a proof of the higher antiquity of these implements. He sends implements from the raised beaches—of flint, thirteen specimens rudely chipped unpolished celts (136910); one hundred and six specimens rude spear, lance, or arrow heads (136911, 136912), forty-six specimens; (136913), seventeen specimens; (136914), fourteen specimens. He also sends scrapers (136915), twenty-one specimens, eight of which are made concave, supposed to have been used for scraping arrow shafts (Figs. 3, 4, 5). He sends (136916) what he calls knives and harpoons (136917), and barbs for fish-hooks (136918, Figs. 6, 7, 8), which compare favorably in their appearance with those sketched by Dr. Rau in his "Prehistoric Fishing," page 121.

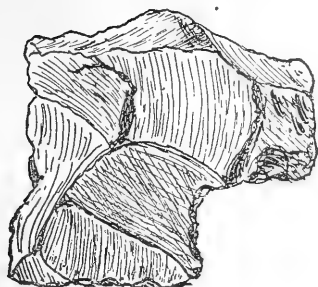


FIG. 3.



FIG. 4.

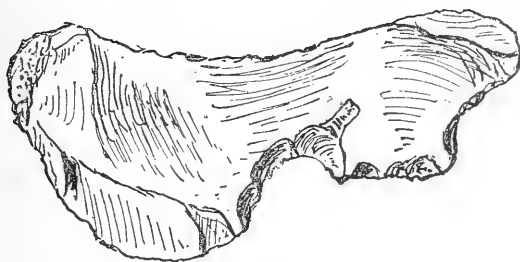


FIG. 5.

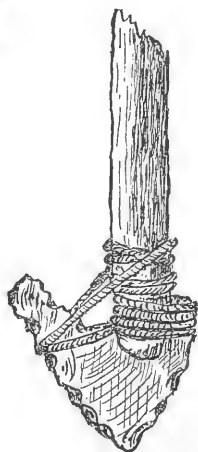


FIG. 6.

SCRAPERS.



FIG. 7.

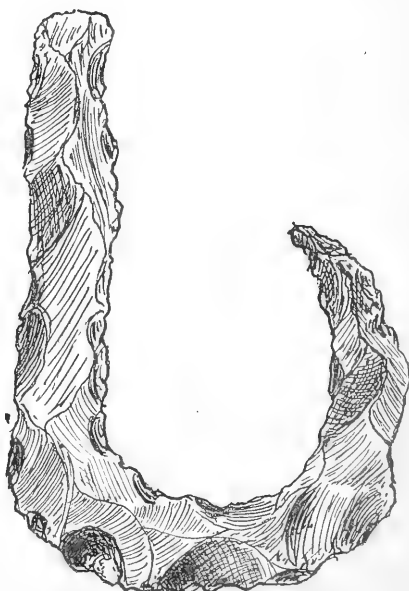


FIG 8

The most important consideration in regard to the collection in the department of Prehistoric Anthropology is that it is much crowded. The number of objects in the collection intended for exhibition amounts to 108,705. These are displayed in cases according to the following list:

	Square feet.
57 upright wall cases, 6 shelves high; 14 trays, each tray 2 feet by 1.2 square feet; 28 square feet to each case; 28 square feet by 57 cases.....	1,596
34 double upright alcove cases, same superfice	1,904
8 double table cases (16 single cases), 8 trays to each	256
The lower portion inclosed with glass and intended for exhibition space ..	256
14 double table tops (28 single), same superfice	448
21 table cases, 8 trays	336
Exhibition space underneath	336
12 table cases, 6 trays, 12 square feet each	144
Exhibition space underneath	144
1 table case, 8 trays	16
6 double hip-roofed cases, with legs, pottery	168
153 cases; total surface (square feet) for exhibition purposes	5,604

The entire superficial area of the hall is 10,000 square feet.

	Sq. Ft.
The space now occupied by exhibition cases is	5,604
Pueblo models	1,750
Twenty-one window spaces, occupied by heaters and Central American sculptures	378
	7,732
Aisles	4,370
Entrance	630
	5,000
Total space accounted for, square feet	12,732

It is apparent from this statement that the cases now placed in the hall can not be put closer together, nor under the arrangement can their number be augmented. A proper display of the objects seems to require additional room. This declaration is not made as a complaint, but for the purpose of putting upon record the necessity for increased space, which may be considered when the opportunity arrives. A suggestion how the present situation may be ameliorated will be made farther on, but no permanent relief can be afforded without an enlargement of space.

Some of the great museums in Europe are comprised exclusively of the objects which pertain to this department. The Musée of St. Germain is exclusively prehistoric, yet it alone occupies the palace of St. Germain, an immense structure with moat and portecullis, built by Henry IV. The palace is now being restored throughout and made fire-proof. Its sole intended use is for this prehistoric museum. Each story is devoted to one prehistoric age. The same general statement is true of the great prehistoric museum at Copenhagen. It occupies the eight large halls of the Prince's Palace, and fills one hundred and eighty-seven

cases. So, also, is it largely true of the prehistoric museums of Stockholm, of Christiania, Edinburgh, Dublin, Lyons, Toulouse, Nantes, Quimper, Vannes, Rennes, of the principal towns of Switzerland, of Berlin, of Rome, and of many towns in Italy.

In all these and many other places which might be easily named, the collection of prehistoric anthropology forms an entire museum of itself, with a full corps of officers and employés. Yet the necessities, as well as the opportunities, for a prehistoric museum are greater in the United States than in any of the countries I have mentioned. Our territory is wider, the field of research is newer, and the prehistoric age of our country is brought so near to us that our opportunities are, as I have said, superior.

There has been transferred to this department twenty-six plaster or *papier-maché* models of ancient Zuñi and Moqui cities, villages, and monuments, from Arizona and New Mexico.*

Some of these have been placed upon the floor in the center of the hall, where they occupy 1,750 square feet of space, nearly one-fifth of the available floor space in the hall. Others, upright models of cliff dwellings, caverns, etc., are placed upon the tops of the high wall cases, so far distant and so high as to be out of the range of vision, which detracts greatly from, if it does not destroy, their interest on the part of the public.

* They were made originally by the U. S. Geological Survey and by the Bureau of Ethnology. A list of them is here given :

List of Moqui and Zuñi villages and monuments, from Arizona, New Mexico, and Colorado, models of which have been placed on exhibition in my hall.

Large Zuni village, from extreme western portion of New Mexico—in heavy mahogany frame.

Group of Moqui villages in the province of Tusayan, Arizona: (1) Wolpi, (2) Secho-movi, (3) Tewa, (4) Mashongnivi, (5) Shipauehuvi, (6) Shemopavi, (7) Oraibe, and relief map of the province of Tusayan, showing the localities of the above-mentioned towns and villages.

Model of Tegna, from Arizona.

Model of Taos, from New Mexico.

Model of Acoma, from New Mexico.

Model of small ruined tower.

Model of large ruined tower.

Model of Montezuma well, in Arizona.

Ancient cliff, or cave towns, or dwellings, fortresses, or monuments.

Model of cave dwelling, actual, in ruins, from Rio de Chelly, Arizona.

Model of the same—restored.

Model of cliff ruin, Rio de Chelly.

Duplicate model of ancient cave town, Rio de Chelly—restoration.

Duplicate cliff ruin, Cañon de Chelly.

Cliff ruin, Rio Mancos.

Mummy cave—a cliff ruin in Cañon del Muerto, Arizona.

Model of ruin of a small pueblo near Pueblo Alto, Chaco Cañon, New Mexico.

Model, restoration of the Pueblo Bonito, an ancient ruin in Chaco Cañon, New Mexico.

There are also placed upon the tops of the wall cases other models, those of prehistoric mounds and earthworks belonging to the United States.*

They are made to represent the surface of the earth in and about the respective monuments. Of course the surface they are intended to represent is horizontal, flat, and it is a solecism to place them perpendicular. The objection mentioned with regard to the other models, as to their being so high as not to be seen, applies equally to these.

There is another reason for re-arrangement, which applies with greater force to some of these mounds. The Etowah Mound, at Cartersville, Georgia, has, for example, been excavated and surveyed by the Bureau of Ethnology. The objects found within that mound are displayed in one of the upright cases, while the model of the mound itself is placed, along with many other models, in a perpendicular position on the top of one of the wall cases. There is thus no relation between the mound and the objects found therein, nor is there any opportunity for the study and comparison of the two in their respective relations.

The prehistoric collections from Central and South America are displayed in scattered cases, separated according to the requirements of space, with the adjoining cases containing North American antiquities, and nothing to distinguish them except perhaps the labels. This display is not effective and detracts largely from the benefit. Many persons fail to see or recognize them as representing a civilization different from that of the stone hatchets and arrow heads, and the Indian pipes, in contiguous cases.

The collection of prehistoric objects from Central America is of great value and interest. It is the largest museum collection in this country, and is exceeded only by that of one private gentleman. It has scarcely received the consideration due to its merits. It should be re-arranged, should be assembled in one locality instead of being scattered as at present, and should have a descriptive catalogue, with maps and illustrations worthy of the merit and rarity of its objects.

In this connection I submit a list of the idols and images and other antiquities, which have lately been transferred to this hall, coming also from Central America, and which should be included in the catalogue:

957 Zapatero Island, Lake Nicaragua. E. G. Squier.	62091 Ometepeec Island, Lake Nicaragua. C. C. Nutting.
958 Zapatero Island, Lake Nicaragua. E. G. Squier.	953 Momotombita Island, Lake Nicaragua. E. G. Squier.
954 Momotombita Island, Lake Managua. E. G. Squier.	61803 Dos Novillos, Costa Rica. M. C. Keith.
	70523 Moqui, Arizona. J. Stevenson.

* Model of Effigy Mound in Wisconsin. Model of ancient earth-work at John Linn's place, Union County, Illinois. Model of the large Etowa Mound, Bartow County, Georgia. Model of the Great Elephant Mound in Grant County, Wisconsin. Model of group of Effigy mounds near Kickapoo River, Wisconsin. Model of Serpent Mound, Ohio. Model of Alligator Mound, Ohio. Model (cast) of rock inscription in Winchester, Scott County, Illinois. Model of the burial pit of Nelson Mound, Caldwell County, North Carolina.

60892	Costa Rica.	M. C. Keith.	17127	Porto Rico.	G. Latimer.
98712			61807	Dos Novillos, Costa Rica.	M. C. Keith.
61808	Dos Novillos, Costa Rica.	M. C. Keith.	955	Subtiaba, Nicaragua.	E. G. Squier.
92854	Zapatero Island, Lake Nicaragua.	E. G. Squier.	956	Subtiaba, Nicaragua.	E. G. Squier.
17129	Porto Rico.	G. Latimer.	34601	Cast of stone seat, figured, from Ecuador—collection of Antoneo M. Herrera, Lima, Pern.	
2346	Porto Rico.	G. Latimer.			
60891	Costa Rica.	M. C. Keith.	61806	Dos Novillos, Costa Rica.	M. C. Keith.
60894			61798	Dos Novillos, Costa Rica.	M. C. Keith.
61799			60885	Costa Rica.	M. C. Keith.
61809			60893	Costa Rica.	M. C. Keith.
60890	Costa Rica.	M. C. Keith.	60802	Dos Novillos, Costa Rica.	M. C. Keith.
61800			61804	Dos Novillos, Costa Rica.	M. C. Keith.
61801			92856	Chiriqui, Panama.	J. A. McNeill.
17130	Porto Rico.	G. Latimer.	60889	Costa Rica.	M. C. Keith.
17125	Porto Rico.	G. Latimer. (2 specimens?)	9242	Volcano Cartago, Costa Rica.	Cast from original in the American Mus. Nat. Hist. Capt. J. M. Dow.
14148	San Domingo.	Professor Gabb.			
61805	Dos Novillos, Costa Rica.	M. C. Keith.			
14126	San Domingo.	Professor Gabb.			
17126	Porto Rico.	G. Latimer.			

The arrangement of this department of the Museum has been principally according to the implement or object. Arrow and spear points have been arranged in separate cases, divided according to their various forms. Grooved axes have been placed together, polished stone hatchets together, mortars, pestles, hammers, pitted stones, etc., have been generally placed together without regard to locality from which they came, the era or epoch to which they belonged, or their period of civilization. The exhibits received from the Bureau of Ethnology have been displayed in the upright cases, and there each find has been placed by itself, and, so far as possible, separated from all other finds. But in this arrangement no attempt has been made to preserve the unity of neighborhoods in respect of locality. The contents of mounds from Maine and Georgia may be found together in one case, while the collections from neighboring mounds in either State, it may be at different times and of different accessions, may be found in other parts of the hall associated with the contents of mounds from other and different parts of the United States.

It is highly proper that it should be so changed as that contiguous objects should be displayed together. Things that belong together should be displayed together. I have recognized the necessity for this work, but have been loth to commence it, for it would require the inspection and handling of every object in the Museum, and this would mean an examination as to the locality from which it came, the people to whom it belonged, and a consideration of and decision upon the history and purpose of each. This can not be done by mechanics or laborers, but would require the continual labor and attention of Mr. Upham or myself, or perhaps both, and would be a labor of such extent and duration that I am loth to attack it. My little experience in a like attempt in preparing the exhibit for the Cincinnati Exposition confirms me in this feeling. I suppose the work must be done, but "upon the bank I shivering stand, yet fear to launch away."

This arrangement of the objects in the Museum, geographically or

by locality, was contemplated by Dr. Rau. His report for the year ending June 30, 1886, contains the following paragraph:

The collections in question, of course, vary much in extent; they sometimes only fill a tray, but occasionally occupy several shelves of an upright case. Ultimately, when anything like completeness has been reached, they will be arranged geographically.

In the proposed geographic arrangement of the objects in the Museum the entire abrogation of the arrangement according to structural function is not contemplated. It is intended that a series of the respective objects, sufficient to show their normal peculiarities, will be arranged and preserved.

It is suggested that the great hall might to advantage be divided into fictive apartments by means of screens, or better, by wall cases, for the display of collections from separate countries like Central and South America, Mexico, etc., or of the Zuñi or Moqui Pueblo, or of other epochs or monuments like the mounds, the shell-heaps, the caverns, etc. The Museum would be a gainer of space thereby.

The present state of the collection is shown by the following table:

Number of specimens in this department.

Total brought forward from last year.....	101,659
Accessions during the year ending June 30, 1888:	
Exhibition series.....	6,046
Duplicate series.....	926
	————— 6,972
Specimens sent in exchange.....	821
	————— 6,151
Total.....	107,810
Number of last entry in June, 1887	136,920
Number of last entry in June, 1888	139,616

The principal research in which I have been engaged during the past year has been for the evidences of the existence of man during the paleolithic period of the stone age on the continent of North America; in other words, an inquiry as to whether there had been a paleolithic period in America or whether there were to be found evidences of the existence of a civilization in America which corresponded with that of the paleolithic period in Europe. The results of this inquiry are given in full in a subsequent portion of this volume. (See section III.) Another of equal interest, but not so extensive, has been in relation to the ancient matting from Petit Anse, also described in a separate paper.

Much more might have been done but for the absorbing character of the routine work in the department, which it may not be uninteresting to describe in this connection.

That for a single day will serve as a type. The curator and all employés arrive at 9 o'clock (the laborers have already aired, swept, and

dusted the exhibition hall and offices). The mail is opened, letters read and briefed; those pertaining to announcements of accessions are sent to the registrar; requests for information, etc., are answered; boxes opened, specimens received are unpacked, separated, arranged, classified, and all entered in the catalogue. They are then sent out to be numbered with the catalogue number, which is placed upon every specimen with paint of suitable color. The name of the donor and the locality must also appear. They are then, in trays, placed in a special case to be assorted and assigned to their respective places by the curator. There is enough work of this numbering to keep a skilled laborer continually employed. For example, the number of specimens received during the past year was 6,972. The present catalogue number (139916) consists of six figures. The locality and name of donor trebles the labor of marking, making the average of eighteen to twenty-four figures and letters to be painted on each specimen, or a total of 125,000 to 175,000 figures or letters. This requires an average of two painted figures or letters per minute, to be made without stop or break, during the working hours of the entire year. The McGlashan collection from Georgia, comprising twenty thousand and more specimens, had been received before my appointment as curator. Only a partial attempt had been made to number them.

The work of the office on Circular 36 began about the middle of January, but from the middle of February the answers and specimens received from correspondents were, together with their replies and exchanges, sufficient to occupy our entire force. The assorting of the specimens and dividing them into their respective epochs of the paleolithic period was a slow work, requiring care and deliberation. Any intervals of time were occupied in the preparation and writing of the descriptive catalogue of the archaeological collection. The classification of the paleolithic implements had progressed as far on the list as the State of Ohio on the 31st day of May. On the 1st day of June I was notified to immediately commence the preparation of an exhibit from the department of Prehistoric Anthropology for display at the Cincinnati Centennial Exposition. That work required the services of all available force in the office during the balance of the fiscal year and somewhat into the present.

Prior to March 23, 1888, no attempt was made in the office to keep a record of the correspondence, requests for information, notes of reference from other departments, and their answers, etc. During the months of January and February, and up to the 22d of March, there had been sent between five and six hundred circulars. In March there were written and sent, 32 circulars and 13 letters; in April, 25 letters; in May, 45 letters; and in June, 63 circulars and 24 letters; making a total of 202.

My experience has gradually demonstrated, to my own satisfaction at least, that the daily routine business of the office is sufficient to fully

occupy my time during working hours if I devote myself to the performance of its details. This work is important and should not be neglected. I might add, in this connection, that I find my duties in the office sufficient to require the attention and constant labor of three persons instead of one, all of which now devolves on me. First, the daily routine, just adverted to ; second, the re-arrangement of the specimens in the Museum ; and third, the making of a catalogue and other scientific and literary labor. The last is, in my judgment, the most important and will be pressed forward with as much rapidity as the daily routine will permit.

REPORT ON THE DEPARTMENT OF MAMMALS IN THE U. S. NATIONAL MUSEUM, 1888.

By FREDERICK W. TRUE, *Curator.*

In my last report I stated that the chief features of the year's work were the re-arrangement of almost the entire exhibition series in new and specially adapted cases, and the replacement of a portion of the defective material in the study series by the purchase of fresh specimens. During the past year the work has progressed along the same lines, but some special tasks were also undertaken, the foremost of which was the preparation of a large series of specimens for exhibition in the Ohio Valley Centennial Exposition in Cincinnati.

The plan of representing the more important mammals of North America by groups of specimens accompanied by accessories indicative of the habits and natural surroundings of the species, which had been for some time under consideration, was carried into execution by Mr. Hornaday, chief taxidermist. Five groups have been placed in the exhibition hall, one of which, a group of bisons, is one of the largest and most carefully executed works of its kind to be found in any museum.

More valuable material has been acquired by purchase and exchange and less by donations than in previous years. Some interesting specimens were received from two collectors sent out by the Smithsonian Institution, but, with one or two exceptions, very little material has been received from the various branches of the Government service.

No descriptions of new species of North American mammals have been published during the year, though announcements of the discovery of several have been made to some of the scientific societies.

Among the important accessions of the year the foremost, perhaps, was the series of skins of small mammals selected from several collections of small mammals made by Mr. F. A. Stephens in the San Francisco Mountains, Arizona, and the San Bernardino Mountains, California. These included specimens of *Spermophilus tereticaudus*, *Dipodomys deserti*, *Thomomys talpoides perpallidus*, and other species of rodents not previously well represented in the collection. Two specimens of an undescribed race of *Haplodon major* from Point Reyes, Cal., were purchased from Mr. C. K. Worthen. A fine skin of an unusually large

male moose was obtained from Mr. A. B. Douglas, of Eustis, Me., through Dr. C. H. Merriam. It is intended that this specimen shall form the chief figure in a group. Dr. J. C. Merrill, U. S. Army, forwarded from Fort Klamath, Oregon, a considerable collection of small mammals, in addition to those sent last year. During his last tour through the Western Territories, Mr. Hornaday obtained, among other specimens, a very fine pair of wapiti antlers in the "velvet." Not less interesting and valuable were two specimens of the Striped Dolphin, *Lagenorhynchus acutus*, which were presented by the U. S. Fish Commission. They were obtained by the officers of the Commission's schooner *Grampus* south of Cape Cod, Massachusetts. A fine Mountain Goat's skin was purchased from Mr. E. C. Babcock.

The only important collection from Central America was the considerable one made by Mr. Charles H. Townsend in the vicinity of the Segovia River, Honduras. This included a valuable series of specimens of an undescribed deer, which has simple antlers like the species of the subgenus *Coassus*, but which nevertheless appears to belong to the subgenus *Cariacus*. Prof. Alfredo Dugès presented a specimen of the rare meadow mouse, *Arvicola quasiater*, from the Valley of Mexico.

The most important Old World mammals obtained during the past year were those received from Prof. H. A. Ward in exchange for skins of North American species. The collection included several lemurs, cats, civets, squirrels, and kangaroos, all of which were of species new to the Museum series. The Zoological Society of Philadelphia, through Mr. A. E. Brown, presented a fine male harnessed antelope (*Tragelaphus scriptus*), an Indian squirrel (*Sciurus bicolor*), and a Moor monkey (*Semnopithecus maurus*). Mr. Valdemar Knudsen presented two additional specimens of the bat found in the Sandwich Islands. It is a species of *Atalapha*, which is apparently distinct from those hitherto described. Mr. F. A. Lucas presented a skull of Burchell's zebra. A skull and skeleton of the Ziphioid whale known as *Ziphius grebnitzkii* were received from Mr. N. Grebnitzky, who obtained them from Bering Island.

In my last report I stated that new cases for almost the entire exhibition series were received at the end of the fiscal year. The month of July, 1887, was spent in planning the interior fittings for these cases and in re-arranging the collection. The improvement in the appearance of the collection resulting from this work has been much commented upon by visitors.

The new wings added to the large wall-cases were fitted with shelves and bases, and the one intended for the seals was filled with specimens. The east wing, intended for the large ruminants, has not been arranged. Before the plans had been finished, the majority of the specimens were in requisition for display in the Cincinnati Exposition, and no permanent installment could be made.

The cast of the Humpback whale, which had previously rested upon iron standards at the south end of the exhibition hall, was suspended

from the roof. By this change a considerable floor-space was made available for other purposes.

By far the most important additions to the exhibition series were the groups already alluded to. Five of these works, representing the bison, prairie wolf or coyote, opossum, prong-horn antelope, and prairie-dog, have been placed in the hall. The bison group occupies a case about 17 feet long, 12½ feet wide, and 9 feet high. All the groups were designed by Mr. W. T. Hornaday and were executed by himself, assisted by Messrs. J. Palmer, A. H. Forney, and William Palmer. Great pains were taken to make the groups true to nature, and in the case of the bison, coyote, and antelope, the turf, bushes, and other accessories were brought from Montana with the specimens themselves. The work has been very carefully done, special attention having been given to matters of detail. Several new groups are in preparation.

In addition to these five groups, which together include twenty-seven specimens, the taxidermists have mounted about thirty other mammals. A few of these were still without stands at the end of the year or could not be completely finished for lack of materials, and the remainder were sent to the Cincinnati Exposition. The usual list will therefore be held over for next year's report, when the work done for the Cincinnati Exposition will be reported upon in full.

In addition to the regular routine work connected with the identification and cataloguing of new specimens, correspondence, the preparation of labels, etc., several special tasks were undertaken. The entire collection of skulls was furnished with uniform labels, and the skins of the monkeys and carnivores also received fresh labels, replacing the old ones, many of which were becoming illegible. It should be remarked here that the original labels received with the specimens are never removed unless, as sometimes happens, they are of absurdly large size.

The skins which had accumulated in the taxidermists' tanks, amounting to over three hundred, were divided into two lots, preparatory to being taken in hand by the taxidermists, some being assigned to the exhibition series and others to the study series. A considerable number of large skins belonging to the latter series were received from the taxidermists during the year, and were temporarily stored in the lower part of some of the exhibition cases.

The alcoholic collection has been temporarily placed on shelves in the south entrance of the Museum. The jars have been repeatedly examined, and the collection is in a fair state of preservation.

The boxes containing the skins of ruminants and other large mammals are stored in the south entrance and are practically inaccessible for want of space.

A new card-catalogue of the exhibition series has been formed by pasteing copies of the printed labels on standard cards. The other card-

catalogues are in the same condition as when last reported upon, except that the new accessions have been entered upon them.

A series of antlers of North American deer was prepared for and sent to the Minneapolis Exposition.

A general bibliography of works upon the Mammalia, commenced some time ago, now comprises about fifteen thousand titles. All the titles cited in the Zoological Record, the first and second parts of Carus and Englemann's Bibliotheca, the Zoologischer Anzeiger, and Friedländer's catalogues are included, as well as references to the brief but often valuable notes to be found in the *American Sportsman*, *Forest and Stream*, and other journals of like character. This is, of course, only a beginning, but I have already found the catalogue of much service in connection with the work of the department.

As a foundation for the work of representing graphically the geographical distribution of our North American mammals, copies have been made of all the available faunal lists, about sixty-seven in number, which have appeared from time to time in various works on the Nearctic fauna.

The curator obtained some additional information regarding the type-specimens of different species of dolphins during a short journey in Europe in the early part of the year, and has added to his review of the family a synopsis and materials for figures of all the species. The paper has not yet been published. He also prepared descriptions of two new rodents from Padre Island, Texas, and of the Sandwich Island bat, some notes on *Vesperugo hesperus* (Allen), and a review of the changes in the catalogue of North American mammals in the last ten years. None of these papers have been published during the year. The curator and Mr. E. W. Nelson have published a report upon the mammals obtained by Mr. Nelson in Alaska, 1877-'81.

The following figures show the number of specimens in the different series on June 30, 1887, and June 30, 1888, respectively.

	June 30, 1887.	June 30, 1888.
Number of specimens in the exhibition series of skins.....	752	696
Number of specimens in the duplicate and study series of skins.....	4, 088	4, 375
Number of specimens in the alcoholic series.....	2, 971	3, 049
Total	7, 811	8, 120

It will be noticed that the exhibition series is smaller than at the close of the previous year. This is due to the fact that when the new exhibition cases were received a large number of old mounted skins, which were in a more or less dilapidated condition, were withdrawn from exhibition and placed among the duplicates. This replacement of defective specimens by good ones must go on gradually for several years, until the collection is entirely renovated. The number of specimens actually added during the year was thirty-two.

Among the accessions were about sixty species and subspecies not previously represented in the collection.

The number of skins and specimens in alcohol added and distributed during the year was as follows:

Number of specimens added, 247; number of specimens distributed, 69.

Four specimens only were received on deposit.

The first entry for the year in the catalogue of skins and alcoholics was No. 15900; the last, on June 27, 1888, was No. 16236.

The present condition of the collection as regards preservation is, on the whole, satisfactory. The study series of skins, however, is still in cases which are not dust-proof. To devise effective and manageable appliances is a matter of considerable difficulty owing to the great disparity in size among the skins and the cramped condition of the laboratory. Several plans are under consideration, however, and the curator hopes to be in a position to recommend the adoption of some one of them in the immediate future.

The skins of large mammals which have accumulated during the past twenty-five years, being at present, as already stated, stored in large boxes arranged in tiers in the south entrance of the Museum building, are almost inaccessible for study. Better provisions for them and for the large skins recently received from the taxidermists are much to be desired. A partial reconstruction of the storage cases now in the laboratory and the addition of one new case would meet the present requirements.

The mammals in alcohol deteriorate in spite of our best efforts to preserve them. The spirits dissolve out the pigment of the hair, causing it in most cases to assume a pale brown color. Such specimens give a false notion of the real colors of the species, and are useful to students of systematic zoology only for measurements. The curator is not satisfied, therefore, that it is profitable to maintain so large an alcoholic collection and has seriously considered the advisability of converting a portion of the more recently-acquired specimens into dry skins. Many gaps in the series of skins could thus be filled, and there would still be an abundance of material for anatomical investigation.

REPORT ON THE DEPARTMENT OF BIRDS IN THE U. S. NATIONAL MUSEUM, 1888.

By ROBERT RIDGWAY, *Curator.*

The year's work has consisted, as heretofore, largely of routine work, such as the receiving, unpacking, cataloguing, labeling, and installation of collections, making of exchanges, correspondence, etc. In addition to the large amount of work done under these separate headings, nearly the entire exhibition collection has been re-arranged, the cases being fitted with patent adjustable shelving and repainted. This important work is still going on, and progresses as rapidly as the cases can be put in proper shape.

During the last two months of the year the time and work of the department was devoted exclusively to the preparation, cataloguing, labeling, and packing of the collections for the Centennial Exposition in Cincinnati, Ohio. During this time all the energies of the curator and his assistants were directed toward making the ornithological exhibit as creditable to the Museum as possible, and I am glad to state that these efforts were crowned with complete success. The bird exhibit embraced: (1) Five hundred and thirty finely mounted birds representing the characteristic types of all the zoogeographical regions of the earth, arranged in four double mahogany cases, each specimen provided with a printed label giving the vernacular and systematic names as well as the geographical distribution of the species; (2) a group of mounted birds representing such species as play a conspicuous rôle in literature, with the names by which they are known in works of poetry, and a quotation of some characteristic poem relating to the species printed on the labels; (3) twelve artistic groups of North American water birds, in two mahogany cases, mounted with surroundings indicating their natural habitat; (4) a collection of eggs and casts of eggs ranging from the enormously large egg of the extinct *Epyornis* or Giant Ostrich to the tiny egg of the Humming-bird, with explanatory labels; (5) a series of original water-color paintings, by the curator, representing extremely rare North American birds, either extinct or on the verge of extinction; (6) a series of fac-simile reproductions of plates of Audubon's great work on the Birds of North America, appropriately framed and labeled. As a special feature of the exhibit illustrating the geographical

distribution, a series of colored maps may be mentioned, each representing one of the zoogeographical regions of the earth.

The more important accessions received during the year are the following :

C. E. Aiken, of Colorado Springs, Colorado : 5 specimens of *Leucosticte atrata*. (Purchased.)

Anastasio Alfaro, San José, Costa Rica: The type specimen of *Porzana alfari* recently described by Mr. Ridgway. (Gift.)

William C. Avery, Greensborough, Alabama : 3 specimens of *Peucea bachmani* from Greensborough. (Gift.)

Edward Bartlett, Maidstone, Kent, England : 59 specimens, 48 species, nearly all from the Old World, especially Australia, a few new to the collection. (Exchange.)

C. W. Beckham, Washington, District of Columbia : 219 specimens, 53 species, from southwestern Texas. This is an extremely interesting collection, which, both on account of its excellent preparation and the extensive series of many of the rarer birds hitherto represented in the Museum by a few specimens only, may be regarded as one of the most valuable accessions received of late. (Gift.)

Lieut. H. C. Benson, U. S. Army, Fort Huachuca, Arizona : 32 specimens, 16 species; a very valuable and interesting collection, containing among others a fine adult specimen of *Trogon ambiguus*, a series of ten *Corvus cryptoleucus*, and four *Falco fusco-cærulescens*. (Gift.)

Bergen Museum, Bergen, Norway : 75 specimens, 39 species, mostly from western Norway. Among these may be mentioned a series of eight Eiders (*Somateria mollissima*), of special interest as offering good material for comparison with the North American forms. A specimen of a *Leucosticte*, from Siberia, is also of particular interest. (Exchange.)

William Brewster, Cambridge, Massachusetts : 3 specimens, 3 species, viz, a Green Heron, *Ardea virescens frazari*, nov. subsp., from Lower California; a specimen *Aimophila sonorana*, nov. spec.; and an *Amphispiza quinquestriata*, both from northern Mexico. (Gift.)

William Brewster, Cambridge, Massachusetts : 94 specimens, 25 species, all collected by Mr. M. A. Frazar in Lower California. This collection is an extremely interesting accession, containing, as it does, large series of well prepared specimens of many rare species; for instance, 6 specimens of *Merula confinis*; 12 specimens of *Geothlypis beldingi*; 5 specimens of *Basitinnia xantusi*; and 13 specimens of *Columba fasciata viosca*, recently described by Mr. Brewster. (Gift.)

Amos W. Butler, Brookville, Indiana : 3 specimens, 3 species, from Mexico and Jamaica, one being an authentic specimen of *Ammodramus brunescens*, recently described by Mr. Butler. (Gift.)

C. W. Chamberlain, Boston, Massachusetts : 20 specimens, 2 species from Gurnet Beach, Massachusetts, viz: 14 Ipswich Sparrows (*Ammodramus princeps*), and 6 Horned Larks (*Otocoris alpestris*). (Exchange.)

H. K. Coale, Chicago, Illinois : 4 specimens, 4 species, from South America and Malacca, all new to the collection. (Exchange.)

W. A. Conklin, Central Park Menagerie, New York City : A *Cacatua moluccensis* in the flesh. (Gift.)

C. B. Cory, Boston, Massachusetts : 12 specimens, 8 species, Old World Woodpeckers. (Gift.)

C. B. Cory, Boston, Massachusetts : A specimen of *Mimus magnirostris* from St. Andrews, West Indies, a species but recently described, and new to the collection. (Exchange.)

Costa Rica National Museum, San José, Costa Rica, Central America : Specimen of *Cotinga amabilis*, and the type specimen of a new species of *Aramides*. (Gift.)

S. W. Denton, Wellesley, Massachusetts : 13 specimens, 12 species, from Australia

and New Guinea. Among these may be mentioned a specimen of Prince Albert's Crowned Pigeon; a Victoria Lyre-bird; and a female *Drepanornis albertisi*, a Paradise bird of a genus hitherto unrepresented in our collection. These form a valuable addition to the exhibition series. (Purchased.)

H. E. Dresser, London, England: 21 specimens, 19 species, from various localities in the Old World, besides a number of rare species new to the collection, among which a fine male of *Ammodramus bouhami* is to be mentioned. The collection contains the downy plumages of 9 species of water birds, a series of great value and interest. (Exchange.)

Prof. A. Dugès, Guanajuato, Mexico: 15 specimens, 14 species, from northern Mexico. (Gift.)

Vinal N. Edwards, Wood's Holl, Massachusetts: 35 specimens, 16 species, in the flesh, chiefly water birds from Wood's Holl.

Dr. W. H. Fox, Washington, District of Columbia: 76 specimens, 37 species, birds from Massachusetts and New Hampshire. (Exchange.)

C. S. Galbraith, through G. N. Lawrence, New York City: Three male Bachman's Warblers, from Lake Pontchartrain, near New Orleans, Louisiana. (Purchased.)

Denis Gale, Gold Hill, Colorado: 8 specimens, 5 species, from Colorado. (Gift.)

N. S. Goss, Topeka, Kansas: 4 specimens, 2 species, being one pair each of the two new species, *Sula gossi* Ridgw. and *S. brewsteri* Goss, discovered by Colonel Goss on San Martir Isle, Gulf of California, the males being the types of the respective species. (Gift.)

A. H. Hawley, Los Gatos, California: 6 specimens, 6 species, from Los Gatos. (Gift.)

P. L. Jouy, Washington, District of Columbia: 1 specimen Lady Amherst Pheasant (*Phasianus amherstiae*), full plumaged old male. (Exchange.)

P. L. Jouy, Washington, District of Columbia: 45 specimens, 35 species, from China. This collection contains several interesting and rare species from the interior of China, as, for instance, *Suthora alphonsiana*, *Pycnonotus xanthorrhous*, etc., and many are new to the Museum collection. (Gift.)

Valdemar Knudsen, Boston, Massachusetts: 25 specimens, 12 species, from the Islands of Kauai and Kūhāi, Hawaiian Archipelago. A very interesting collection, adding several species to the Hawaiian fauna, and one species, *Puffinus knudseni* Stejn., new to science. (Gift.)

T. McIlwraith, Hamilton, Ontario, Canada: 9 specimens, 8 species, from British Columbia. (Exchange.)

Dr. C. Hart Merriam, Washington, District of Columbia: A fine albino *Urinator lumme*, from Canada, and a Yellow-billed Tropic-bird, from the Bahamas. (Exchange.)

Dr. C. Hart Merriam, Washington, District of Columbia: Wing of *Euethia canora*, collected by Mr. M. E. Spencer at Sombrero Key, Florida, the first specimen of this species obtained in North America. (Gift.)

A. Nehr Korn, Riddagshausen, Braunschweig, Germany: 67 specimens, 54 species, chiefly from Africa and the Malay Archipelago. Nearly all the species were unrepresented in the Museum, and many are of great variety and beautiful plumage, containing among others no less than 24 gaily-colored pigeons, of which seven species are of the genus *Ptilinopus*. (Exchange.)

Dr. August Müller, Berlin, Germany: 24 specimens, 21 species, rare and interesting birds from Africa and the East Indies for the exhibition series. The Ground Hornbill (*Bucorvus capfer*) and *Musophaga rosæ* deserve special mention. All new to the collection. (Purchased.)

E. W. Nelson, Springerville, Arizona: 102 specimens, 38 species, from Arizona, Colorado, and New Mexico; a very valuable collection, filling many important gaps in the Museum collection and completing the series of several of the rare western species. (Purchased.)

William Palmer, Washington, District of Columbia: A specimen of Kirtland's Warbler (*Dendroica kirtlandi*), a very rare species, and one Grinnell's Water-Thrush

(*Seiurus noveboracensis notabilis*), both from the District of Columbia, and the first captures of the respective forms east of the Alleghanies. Also 4 specimens, 2 species, of Flycatchers, from Michigan. (Gift.)

C. W. Richmond, Washington, District of Columbia: A mounted specimen of the Darter (*Anhinga anhinga*). (Exchange.)

Robert Ridgway, Washington, District of Columbia: 15 specimens, 14 species, from Gainesville, Virginia. (Gift.)

C. B. Riker, New York City: 45 specimens, 43 species, from the Lower Amazon. Many of these are types of new species described by the curator in the "Proceedings" of the Museum. (Exchange for determining the species in his collection.)

José N. Ravirosa: 14 specimens, 13 species, from the State of Tabasco, Mexico. (Gift.)

Henry Seebohm, London, England: 56 specimens, 22 species, mostly from the Old World. This collection is a very interesting and valuable one, containing, as it does, many species from Asia and Africa, hitherto unrepresented in our Museum, besides large series of the more difficult Old World Plovers. Among the American birds contained in the collection a specimen of *Merula murina*, from Roraima, British Guiana, recently described, and one of *Hamatopus leucopodis*, from the Falkland Islands, both new to the Museum collection, deserve special mention. (Gift.)

G. B. Sennett, New York City: 138 specimens, 34 species, from southern Texas. (Exchange.)

O. C. Smith, Tombstone, Arizona: A male *Trogon ambiguus*, from Arizona. (Gift.)

Stavanger Museum, Stavanger, Norway: 20 specimens, 18 species, from Norway. (Exchange.)

Col. A. G. Tassin, U. S. Army, commander, Bedloe Island, New York: 260 specimens, 40 species, in the flesh, killed by flying against the electric light of the statue of Liberty. (Gift.)

Ernest E. Thompson, Toronto, Ontario, Canada: 41 specimens, 21 species, from Canada. (Gift.)

Tokio Educational Museum, Tokio, Japan: 14 specimens, 11 species, from the Islands of Idzu, Japan. Though small in number, this collection is extremely interesting as coming from a group of islands hitherto unexplored. Mr. Namiye, of the Tokio Educational Museum, visited the Islands of Idzu during the early part of 1887. The most interesting specimens are 3 Crow Pigeons (*Lanthanas ianthina*), and a pair of a very distinct new species of Thrush which Mr. Stejneger has named *Turdus celanops*. (Gift.)

Charles H. Townsend, Washington, District of Columbia: 205 specimens, 96 species, from Segovia River, Honduras. (Smithsonian exploration.)

Charles H. Townsend, Washington, District of Columbia: 125 specimens, 63 species, from Runtan Island and Truxillo, Honduras. (Smithsonian exploration.)

U. S. Fish Commission, Washington, D. C.: 179 specimens, 59 species, all collected during the cruise of the Fish Commission schooner *Grampus*, Capt. J. W. Collins, by Messrs. William Palmer and Frederic A. Lucas, of the National Museum. The collection is a valuable one, not only for the species collected, but also for the excellence of their preparation. It contains many interesting species and plumages, especially those of young birds. A pair of the Newfoundland Ptarmigan (*Lagopus velchi*) recently described, and hitherto unrepresented in the Museum collection, deserve special mention.

U. S. Fish Commission, through Vinal N. Edwards, Wood's Holl, Massachusetts: A large number of birds in the flesh, of which 14 specimens, representing 8 species, mostly water birds, have been prepared.

Dr. B. H. Warren, West Chester, Pennsylvania: 63 specimens, 3 species, from Chester County, Pennsylvania, being series of *Quiscalus quiscula* and *Agelaius phoeniceus*. (Gift.)

José C. Zeledon, San José, Costa Rica: 3 Paradise Trogons (*Pharomacrus costaricensis*) in excellent plumage. (Purchased.)

Zoölogical Society of Philadelphia, through Mr. Arthur E. Brown: A Lady Amberst Pheasant, an Australian Parrot (*Psephotus zanthorrhous*), and a Demoiselle Crane, all in the flesh. Also a specimen Javan Adjutant (*Leptoptilos javanicus*) in the flesh. All form valuable and interesting additions to the exhibition series. (Gift.)

Owing to the inadequate number of cases and the unsuitable construction of those available, it has not been possible to make rapid progress with the systematic re-arrangement of the exhibition series; a satisfactory beginning has, however, been made, and the large amount of necessary work that has been done in the way of remodeling cases insures more rapid advancement of the work during the present year.

The study series has been steadily improved in arrangement, as opportunity afforded, and as the necessary cases and drawers became available.

The complicated preparations necessary for the orderly arrangement and systematic classification of such extensive and bulky collections as those belonging to the bird department having nearly been completed, it is safe to say that the work will henceforth progress rapidly, provided the required additional cases are forthcoming as they may be needed.

The extent of general routine work may be briefly stated as follows:

Pages (MS.) of articles submitted for publication based on Museum material.	*345½
Proof corrected—printed pages	259½
Proof corrected—printed galleys.....	91½
Official letters written	326
Official memoranda written.....	233
Invoices (triplicates) written.....	206
Monthly reports written (pages MS.)	114
Annual report written (pages MS.)	74
Memoranda of packing, written (pages MS.)	135

In addition to the above, many hundred labels were written and proof corrected.

Owing to the vast amount of labor required by matters mentioned under the first and third sections of this report, very little time has been available for special research, the principal part of what was accomplished by the curator being necessarily done out of office hours. It is much to be regretted that no more time can be given to work of this kind, of the greatest importance to ornithological science as well as to the collection, whose value is increased as its component parts or sections become the basis of original monographic work; and no collection of American birds contains a greater quantity of material for such original research, urgently required for the advancement of the science, than that of the bird department of the National Museum. So much has the function of the curator of this department become that of a purely administrative head, that his occupation consists almost entirely in the performance of numberless complex routine duties connected with the receipting for, unpacking, cataloguing, labeling, installment,

* Of these 198½ pages were prepared by the curator and 147 by the assistant curator.

and reporting upon collections or specimens received, correspondence, exchanges, arrangement of the exhibition series, etc., that practically he is removed from the rank of active ornithologists. By unusual effort, however, the curator has managed to prepare a review of the Mexican and Central American members of the following families of birds: Thrushes, Mocking Thrushes, Warblers, Titmice, Creepers, and Dippers; determined a collection of birds from the Lower Amazon, containing thirteen new species and one new genus, and a large collection from islands in the Caribbean Sea and the coast of Honduras; also containing novelties, a monograph of the genus *Dendrocicla*, and another of the interesting and greatly confused genus of Passerine Parrots (*Psittacula*), in each of which is described several previously unknown species.

The assistant curator, Mr. Leonhard Stejneger, has continued his studies of the splendid collection of Japanese birds belonging to the National Museum. During the year several large private collections from the same country have been received for examination, upon which extensive reports are still in progress of preparation. In connection with these studies he investigated several groups of European birds, with the result of clearing up several doubtful points. He has also reported upon two collections of birds from the Hawaiian Islands received during the year.

The present condition of the collection, so far as the preservation of the specimens is concerned, could not possibly be better. As to convenience of arrangement, much improvement is to be desired; but this will be possible only when at least twice the amount of room is provided for its accommodation.

It has not been practicable to make an actual count of the specimens in the bird collection, but their number is very nearly as given in the following careful estimate:

	1886-'87.	1887-'88.	Increase.	Decrease.
Reserve series	40, 875	43, 454	*2, 579	.....
Exhibition series	7, 000	6, 421	.....	†579
Duplicate series	7, 112	6, 609	.....	‡503
Total	54, 987	56, 484	1, 497	.....

* Total number of accessions 2,207, minus 207 estimated to have been placed in the duplicate series, and 376 having been mounted for the exhibition series, plus 955 specimens which have been dismounted and returned to the reserve series.

† Specimens dismounted and placed in the reserve series 955, minus 376 mounted from the reserve series.

‡ Duplicates distributed 710, minus 207 of the accessions received during the year and placed among the duplicates.

Last entry in catalogue in June, 1887, No. 111453; in June, 1888, No. 113659.

REPORT ON THE SECTION OF BIRDS' EGGS IN THE U. S. NATIONAL MUSEUM, 1888.

By Capt. CHARLES E. BENDIRE, U. S. A., *Honorary Curator.*

The following important additions have been made to the collection of birds' eggs during the year:

From Lieut. H. C. Benson, Fourth Cavalry, U. S. Army, Fort Huachuca, Arizona, were received 6 species, 14 specimens. Some of the rarer amongst these are as follows: *Columba fasciata* (2 specimens); *Callipepla squamata* (3 specimens); *Vireo huttoni stephensi* with nest (3 specimens); *Psaltriparus plumbeus* (2 nests) are new to the collection. From Dr. J. C. Merrill, assistant surgeon U. S. Army, Fort Klamath, Oregon, came 11 species, 77 specimens. Among them were 4 sets, 22 specimens, of *Parus gambelli*. From Dr. A. K. Fisher, Department of Agriculture, were received 1 set of 2 eggs of *Buteo latissimus*. From T. Stephens, San Bernardino, California, were purchased 1 set of 4 eggs and nest of *Polioptila californica*; new to the collection. Mr. C. W. Richmond, Washington, District of Columbia, gave a collection of 84 species, 950 specimens, mostly from the District of Columbia. From Denis Gale, Goldhill, Boulder County, Colorado, was received a fine collection, including *Bubo virginianus subarcticus* (2 specimens), and *Carpodacus cassinii* (4 specimens). Dr. William C. Avery, Greensborough, Alabama, presented 2 nests and a set of 3 eggs of *Dendroica vigorsii*; 4 sets, 15 specimens, and 3 nests of *Peucaea aestivalis bachmani*; new to the collection. Col. N. G. Goss, Topeka, Kansas, contributed 1 egg of *Sula gossi* and 2 eggs of *Sula brewsteri*; both species new to the collection. Dr. C. Hart Merriam, of the U. S. Department of Agriculture, gave nests and 4 eggs of *Geothlypis philadelphia*. Herbert Brown, Tucson, Arizona, presented four specimens of *Piranga rubra cooperi*; 2 nests and 8 specimens of *Harporhynchus bendirei*; and 1 nest of *Harporhynchus palmeri*, and others. The nests are new to the collection.

One hundred and four nests have been received during the year.

The character of the routine work has consisted in taking the measurements, numbering, classifying, and re-arranging 1778 specimens; relabeling and arranging part of the reserve series of eggs after the "American Ornithological Union" check-list, and repacking and labeling a large duplicate series of nests.

The following tabulated statement gives the present state of the entries in the catalogue, and of the condition of the collection:

Last entry in June, 1887	23, 160
Last entry in June, 1888	23, 647
Total number of entries	487
Total number of eggs received	1, 778
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Number of specimens in reserve series	34, 677
Number of specimens in duplicate series	11, 548
Number of specimens on exhibition	1, 491
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Total number of eggs	47, 716
Total number of species and subspecies	721
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Number of nests in reserve series	*2, 104
Number of nests on exhibition	235
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Total number of nests	2, 339

* Including the 104 nests received during the year.

REPORT ON THE DEPARTMENT OF REPTILES AND BATRACHIANS IN THE U. S. NATIONAL MUSEUM, 1888.

By H. C. YARROW, M. D., *Honorary Curator.*

Owing to the fact that repairs were made to the west basement of the Smithsonian building in which is situated the room set apart for the curator of the Department of Reptiles and Batrachians, it was found somewhat difficult to attend properly and promptly to the ordinary routine work of the department; still this has been performed as expeditiously as was possible under the circumstances. It was found necessary to transfer the entire "reserve series" of reptiles to storage rooms provided for the purpose, and this transfer was so carefully done that not a single specimen was injured.

Since the return of the collection to the room where it belongs, it has been carefully gone over, bottles relabeled if necessary, filled with fresh alcohol, and put in complete systematic order for reference or study.

During the repairs the office of the curator has been twice moved, comfortable quarters having been assigned him.

Much credit is due my assistant, Mr. E. S. Rheem, for the careful manner in which he has performed his duties.

Among the more important contributors during the year, are Dr. J. C. Merrill, Fort Klamath, Oregon; Charles S. Beachler, Indiana; Lieut. J. F. Moser, U. S. Navy; H. D. Hood, Florida; James Bell, Gainesville, Florida; William Taylor, San Diego, Texas; Lieut. H. C. Benson, U. S. Army, Fort Huachuca, Arizona; Dr. T. H. Bean, U. S. Fish Commission; W. A. Conklin, Central Park, New York City; George W. Shutt, Hillsborough, Virginia; R. E. Call, Des Moines, Iowa; Capt. W. L. Carpenter, U. S. Army, Fort Apache, Arizona; R. E. C. Stearns, U. S. Geological Survey; George B. Forrester, New York City, "supposed antidote for snake-bite;" Donald MacRae, Wilmington, North Carolina, "Mad Stone;" Julius Hurter, St. Louis, Missouri; U. S. Fish Commission, Wood's Holl, Massachusetts; Theo. D. A. Cockerell, Westcliffe, Custer County, Colorado; Edward Bartlett, Maidstone, England; E. H. Park, Orange, Florida; Willis Lewis, Henderson, North Carolina, "supposed antidote for snake-bite;" M. Hamilton, Savannah, Georgia; C. Toppan, Salem, Massachusetts, and Dr. Charles S. Herron, Bartow, Florida, "supposed antidote for snake-bite;" Charles R. Ellis, Florida;

S. G. Brown and William Palmer, National Museum; W. C. Burns, Austin, Texas; John S. Webb, Stanley County, North Carolina; Charles B. Cory, Boston, Massachusetts. The collection made by the latter was sent to Professor Cope, of Philadelphia.

In addition to the usual routine work, the Reptile Department was moved back into its old quarters in the west basement of the Smithsonian building; all the alcoholic specimens contained in bottles, probably five thousand, were carefully cleaned and refilled, when necessary, with fresh alcohol; the "reserve series" has to a great extent been relabeled, and arranged systematically in the cases prepared for it; a number of new specimens have also been added. The "reserve series" of *Testudinata* has been properly attended to and arranged in cases, and the "duplicate" reptiles, contained in tanks, were overhauled, and are all in excellent condition.

All this extra work necessitated the services of a laborer, who was detailed on requisition, from time to time. It is to be hoped that one will be detailed permanently in this department, as the great increase in work is such that one is greatly needed.

The following special researches have been carried on:

Prof. E. D. Cope, of Philadelphia, has continued his studies upon the batrachia, and is now engaged upon the reptiles proper.

The curator has investigated the subject of crotalus venom, its action upon animals, and a number of experiments were tried with so-called "antidotes" to the venom. A popular account of the experiments, by permission of the Assistant Secretary, was published in "Forest and Stream," New York, May and June, 1888. It is intended to continue these experiments during the fall and winter.

The present state of the collection is shown in the following statement:

Number of accessions received during the year ending June 30, 1888, 43, comprising 122 specimens. Number of entries in reptile catalogue, for the year ending June 30, 1888, 83.

Specimens received for year ending June 30, 1886	1,705
Specimens received for year ending June 30, 1887	503
Specimens received for year ending June 30, 1888	122
Specimens in reserve series	9,631
Specimens in general series	8,819
Exhibition series, selected for, domestic	600
Exhibition series, selected for, foreign	150
Not classified, and exotic specimens, properly	6,134
<hr/>	<hr/>
Total	27,664
Last catalogue number in June, 1887	14,722
Last catalogue number in June, 1888	14,805

REPORT ON THE DEPARTMENT OF FISHES IN THE U. S. NATIONAL MUSEUM, 1888.

By DR. TARLETON H. BEAN, *Honorary Curator.*

Early in the year the curator was ordered by the Commissioner of Fisheries to investigate and report upon the fishes of Great Egg Harbor Bay, New Jersey, and accordingly left Washington early in July (1887) for that purpose. The work was done under the auspices of the U. S. Fish Commission, and the report upon the same made to the Commissioner. After the curator's return to Washington, considerable time was consumed in the preparation of a paper for publication upon the results of this expedition.

An accumulation of correspondence pertaining to this department was taken up and disposed of. During the period from October (1887) to April (1888) many new forms were described, chiefly of deep-sea fishes. These descriptions have not been published as yet. The descriptions of inland species have, as a rule, however, been promptly printed in the Proceedings.

The collections of fishes in the main hall of the Smithsonian were removed to the basement, and those belonging in the fish hall proper were returned to their places after the fire-proofing had been completed. The removal of collections, especially alcoholics, caused much annoyance and work; labels were destroyed, alcohol spilled, and jars sometimes broken, involving much loss of time and often a pretty general re-arrangement of the collections. The contents of my office were moved back into the old quarters from the Museum.

I was ordered to join the *Grampus* in her southern mackerel fishery investigations, which occupied my time from May 10 to June 15, 1888. Immediately after my return I began to arrange materials for a report on this cruise, based on the specimens which were transferred to the National Museum.

The first number in the register for the year is 39,119, and the last 39,568.

About 1,350 specimens have been entered in the catalogue during the year. These specimens have for the most part been placed in bottles, after having been identified and reported upon, labeled and put in their proper places.

The following collections have been studied and administered upon:

A specimen of *Haplochiton zebra*, new to our collection, was sent by Lieut. W. M. Wood, from Puerto Bueno. Numerous collections made in South America, by W. E. Safford and Senor Don José Arechavaleta, were received and cared for. A small collection of fishes made in Honduras, Central America, by Mr. C. H. Townsend, has been examined and reported upon. Collections of fishes made in Newfoundland and vicinity by the U. S. Fish Commission, schooner *Grampus*, have been identified; also numerous collections made by the steamer *Albatross* off the east coast of the United States have been catalogued and preserved.

Collections have been received from nearly every State and Territory in the Union.

Numerous types of new species have been obtained, descriptions of which have been published in the Proceedings of the Museum. Numerous applications for loans of material for study have been received and attended to.

The present state of the collection is fairly satisfactory.

The entire collection in jars has been overhauled during the year, alcohol supplied where needed, and many new labels placed upon the bottles. New shelving has been furnished, and the places overcrowded have been relieved to some extent. Numerous important additions to the collection have been received; seventeen types of new fishes have been added, besides several rare and little-known forms.

The collection is much improved in condition and arrangement since one year ago.

No duplicates have been distributed except two small lots. There is much material here that could be distributed to museums throughout this and other countries, and profitable exchanges no doubt could be carried out, but not without more assistance than is now allotted to the department.

The total number of accessions received during the year was sixty-two, representing the following localities in the order named:

Maryland.	Massachusetts.	New Hampshire.
New Jersey.	Wyoming.	Quereau Bank.
Mexico.	Virginia.	Washington Territory.
Vermont.	Florida.	Georgia.
Texas.	Colorado.	Mississippi River.
Iowa.	Tennessee.	Bering Island.
New York.	Oregon.	Indiana.
Newfoundland.	Montana.	Peru.
Labrador.	Arizona.	Ohio.
British Columbia.	Central America.	California.
Rhode Island.		

The following form important additions to the collection:

H. A. Ward, Rochester, New York, one box of fishes from Campechy, Mexico, in exchange. July 27, 1887. Accession 19,424.

Dr. H. H. Thorpe, Liberty Hill, Texas, one piece of dentigerous bone (Pycnodont),

similar to one received from Dr. Thorpe on December 29, 1886. August 22, 1887. Accession 19,507.

R. E. Call, Des Moines, Iowa, fishes from the vicinity of Des Moines. August 24, 1887. Accession 19,517.

F. A. Lucas and William Palmer, aboard the schooner *Grampus* on a cruise to Newfoundland and Labrador during July and August, 1887. September 12, 1887. Accession 19,588. Marine and fresh water fishes.

U. S. Fish Commission, Wood's Holl, Massachusetts, two boxes alcoholic specimens of fishes, hauls 2,739-2,749 of the steamer *Albatross*, containing two new species; a *Notacanthid*, and a new *Ceratiid*. September 26, 1887. Accession 19,640.

Otto Gramm, Laramie, Wyoming, a specimen of *Coregonus williamsoni* from the Snake River, Wyoming and Colorado, where it is called Grayling by the residents. Mr. Gramm states that these fish rise nicely to a fly during the evening, but not through the day. September 28, 1887. Accession 19,650.

E. G. Blackford, Fulton Market, New York, one specimen of *Trachynotus goreensis*, measuring 35 inches in length, weight 22 pounds, from near Crisfield, Maryland. October 4, 1887. Accession 19,666.

S. G. Worth, Franklin, Virginia, specimens of *Clupea mediocris* and *Roccus lineatus*, the gills of the latter being infested with parasites. October 12, 1887. Accession 19,692.

E. G. Blackford, New York, a specimen of *Lutjanus blackfordi* $4\frac{1}{2}$ inches long, from Bay Shore, Long Island, on the Great South Bay. Noticed on page 512, Proceedings U. S. National Museum, x, 1887, by T. H. Bean. October 27, 1887. Accession 19,733.

E. G. Blackford, New York, a fresh specimen of the Atlantic salmon, *Salmo salar*, $29\frac{1}{2}$ inches long; taken at Point Monmouth, New Jersey. This specimen has been sketched by Mr. Shindler. November 2, 1887. Accession 19,766.

George C. Magoun, New York, one skin of the Dolly Varden Trout, *Salvelinus malma*, measuring 21 inches in length. The fish was captured in northern Montana, in a stream joining the waters of Upper and Lower St. Mary's Lake, by Mr. Thomas Baring. Noticed in American Angler, January 21, 1888, page 44, by T. H. Bean. The eastern limit of the Dolly Varden Trout. November 8, 1887. Accession 19,783.

W. A. Wilcox, Gloucester, Massachusetts, a new specimen of fish, *Thyrstites violaceus*, captured by the schooner *M. A. Bastan*, Capt. Thomas Thompson. (Bean, Proceedings U. S. National Museum, x, 1887, page 513). November 8, 1887. Accession 19,784.

Gilman Sawtell, Alderdice, Beaverhead County, Montana, three fresh specimens of lake trout, *Salvelinus namaycush*, caught in Henry Lake, Idaho. Noticed in American Angler, January 28, 1888, page 59. November 12, 1887. Accession 19,803.

Charles H. Townsend, a collection of fishes from Honduras, Central America. November 14, 1887. Accession 19,811.

Dr. John D. Quackenbos, New York. Sunapee Lake and Dublin Pond trout. Three specimens of *Salvelinus aureolus*, new species, from Sunapee Lake, New Hampshire. (Bean, Proceedings U. S. National Museum, x., 1887, page 628). November 26, 1887. Accession 19,853.

Charles Willoughby, Indian agent, Quinaielt Agency, Damon, Washington Territory. A new species of fish, *Acrotus*, new genus; *Acrotus willoughbii*, new species. Named in honor of the donor. (Bean, Proceedings U. S. National Museum, x., 1887, page 631). December 17, 1887. Accession 19,957.

Prof. D. S. Jordan, Bloomington, Indiana. Head and fins of a *Salvelinus namaycush*, taken by Ashdown H. Green, of Victoria, British Columbia, in Camin Lake, 120 miles east of New Westminster, on the Caribou Wagon Road. December 23, 1887. Accession 19,979.

Lieut. J. H. Beacon, U. S. Army, Fort Shaw, Montana. One salted skin of *Salvelinus namaycush*, from St. Mary's Lake, northwestern Montana. Also a photograph of the same species taken from a specimen weighing 9 pounds. January 23, 1888. Accession 20,072.

N. Grebnitzky, Bering Island, through the Alaska Commercial Company. Two bottles of fishes collected along the shores of Bering Island. January 25, 1888. Accession 20,086.

Prof. D. S. Jordan, Bloomington, Indiana. One specimen of *Xyrichtys jessia*, new species, collected by C. H. Bollman off Tampa Bay, Florida. February 6, 1888. Accession 20,145.

Rudolph D. Kauffmann, Washington, District Columbia. One shark, *Mustelus*, having two heads, two vertebral columns, two sets of dorsal fins, two upper caudal lobes. Captured near Lima, Peru. May 1888, 10. Accession 20,571.

Charles H. Gilbert, Cincinnati, Ohio. A collection of fishes made in the vicinity of Cincinnati. June 1, 1888. Accession 20,670.

REPORT ON THE DEPARTMENT OF MOLLUSKS (INCLUDING TERTIARY FOSSILS) IN THE U. S. NATIONAL MUSEUM, 1888.

By WILLIAM HEALEY DALL, *Honorary Curator.*

The force of the Department of Mollusks for the period reported on in addition to the Curator, has consisted of Dr. R. E. C. Stearns, Assistant Curator, and Mr. Pierre Louis Jouy, Aid. Assistance has also been rendered from time to time in their work on the fossils collected by the U. S. Geological Survey, by Messrs. Frank Burns and G. Stuart, under my instructions, with the permission of the Director of the Survey.

The work, as in previous years, has largely consisted of the reduction to order, classification, labeling, registry, and arrangement in cases of material either in arrears or received during the current year. The manner in which this is done has been described in previous reports, and it does not seem necessary to repeat the details here. Excellent progress has been made in the work of bringing up the arrears. Unless checked by matters beyond the control of the curator, such as the stoppage of work for alterations in the building, by the necessity of supplying material to exhibitions in other cities from which our department receives no benefit, or the illness of members of the working force, a few years will see these arrearages cleared away. As there is no separation in a biologic sense, so there has been no separation in an administrative sense, between the work on mollusks of the tertiary formations and those obtained from recent seas. To some extent they are kept separated from reasons of convenience in reference and on account of the great weight of some of the fossils, which renders it inadvisable to place them in the same drawer with recent specimens. But it is impracticable to assort the work as between the two classes of material. The curator was absent at Philadelphia at two different times during the past year, aggregating about nine weeks altogether, during which time he supervised the packing, and to a large extent personally performed the labor of registration and packing of the very valuable collection left to the Museum by the late Dr. Isaac Lea. This collection, apart from the minerals with which the writer has had nothing to do, comprised a large number of American and European fossils, largely types of Dr. Lea's publications or specimens selected for their beauty and

neat preparation. There were fossils of all ages; not the least interesting were specimens received from Dr. E. Emmons himself, from the original localities, of forms illustrative of the Taconic formation. There was also a fine series of plant fossils, chiefly of the Coal Measures. These varied materials have been distributed to the curators who properly take in charge such objects, the tertiary fossils and recent shells falling to the department of mollusks. The typical collection of Unios, which is without doubt the most valuable in existence, was kept by Dr. Lea in table cases or drawers with the specimens arranged in a linear series, in the order adopted in his "Synopsis," last edition. They were laid on strips of wood grooved longitudinally, were much crowded, and occasionally somewhat displaced. Paper numbers and names cut out of the Synopsis were fastened to the first specimen of each species by a little wax. These, however, were often displaced, and were, when in place, ready to fall at a touch. Most of the specimens had pencil notes of locality, and often of the name, written by Dr. Lea on the inside of the shell. While it was easy for a skilled and careful person on the spot to recover the identification and obtain the other data, if the specimens had been packed without being registered and permanently marked, their value as types would have been almost wholly destroyed. In order that no misfortune of this sort should occur, I personally examined and removed every specimen, identified, and permanently numbered it, and, when frail or broken, wrapped and boxed it. This involved the writing of more than eighty-five thousand figures on the shells themselves and the registration of some three thousand parcels of specimens, representing more than half as many species. The labor was very arduous, but the specimens were permanently identified and their typical value insured for the future. The gastropods and other shells contained in the Lea collection were left to be registered in Washington, each parcel being in a separate tray in Dr. Lea's collection, accompanied by one or more manuscript labels. My estimate of the number of specimens in the collection is about twenty thousand, and there were sixty-three packing-cases required to hold them, exclusive of duplicates, of which there were a great many. Cases to hold this collection have been provided, in accordance with Dr. Lea's will, and as soon as the projected repairs are completed the northeast gallery will be reserved for this series and other land and fresh-water shells, and thrown open to the public. The miscellaneous land and fresh-water shells given by Dr. Lea are numerous and valuable, including the second best existing series of Cuming's Philippine land shells, of rare beauty, and fine original series of land shells from Maderia, Jamaica, and other localities, named by Lowe, C. B. Adams, and other authorities, and therefore having for their own species a really typical importance. It is understood that, in accordance with law and by direction of the U. S. Fish Commission, the collection of Invertebrata, now at New Haven, in charge of Prof. A. E. Verrill, has been turned over to the Museum,

at least theoretically. When received, this will add more largely to the material in the hands of the department of mollusks than any other accession for some years. As its reception is a matter of uncertainty, owing to the fact that the time when Professor Verrill's report on the Mollusca of the Fish Commission will be ready is entirely uncertain, I would renew my suggestion of previous years that a proper series of specimens for study and comparison be sent from New Haven to the National Museum, where it is much needed. At present, with the mass of work pressing upon the Department of Mollusks, it is not desirable, even had Professor Verrill concluded his investigations, to have the whole mass of the Fish Commission material added to what must be administered upon. The material received from New Haven up to this date, excepting Cephalopods in alcohol, is largely duplicate and of little or no value to the national collection. But for scientific study and comparison it is important that a named series of the New England deep-water and shore fauna, as determined by Professor Verrill, 1872 to 1887, should be accessible to students in Washington.

The total number of accessions to this department during the year is fifty-two. Of these, fifteen lots were sent for examination and report, two were received in the regular course from Government agencies, eight were received in exchange either for material already furnished or which has been subsequently furnished partly by the Department of Mollusks and partly by other departments of the Museum. The remainder were donations. Of these the Isaac Lea collection was the most important and the largest. The next largest accession was that of some sixteen boxes, chiefly of Pliocene fossils from California, received from the U. S. Geological Survey, and collected by Dr. R. E. C. Stearns. Dr. Stearns has also given a large number of miscellaneous specimens, which he obtained during his absence on field-work and which were very acceptable. A valuable though small collection was obtained in exchange from the Museum of Wesleyan University, Middletown, Connecticut. The specimens were from various localities and to a considerable extent filled gaps in the National Collection of mollusks. A lot of some twenty supposed new species of *Unio*, from Florida, was presented by Mr. B. H. Wright, of Penn Yan, New York, most of which were new to the collection. The curator gave some two hundred and fifty species of mostly marine shells to the Museum during the year, nearly all being new or important to the collection. A collection of interesting south European and Turkistan shells were received in exchange from Herr Otto Goldfuss, to whom American land shells were sent. Most of the species sent by Herr Goldfuss were already in the collection, but the localities were interesting and enlarged our geographical series. Mr. Nicholas Grebnitski, of the Commander Islands, near Kamchatka, continued his sending of mollusca, and a package received from him during the year contained very interesting specimens from that remote corner of the world and added several species to its known mollusk-

fauna. Mr. T. H. Aldrich has sent some acceptable specimens of marine shells from the Mauritius and some named Eocene fossils. Lieut. J. F. Moser, U. S. Navy, sent from the coast of Florida some very interesting shells in alcohol, and Mr. Henry Hemphill a most interesting series of varieties of the limpets of the southern California coast.

Dr. W. H. Rush submitted dredgings from deep water on the Floridian coast to be named, and presented a very valuable series of them to the Museum. We received in exchange a series of shells of South Africa from the Albany Museum at Grahamstown, Cape Colony, put up by the curator, Miss Mary Glanville. While awaiting instructions for shipping the material to be sent in return we were shocked to receive news of the death of this gifted and enthusiastic young woman, to whom, according to South African papers, the cause of science in that country and the Albany Museum in particular were greatly indebted. We owe to Mrs. J. H. Everette, of Virginia, a remarkable collection of some seventy-five pearls taken from a single individual of *Ostrea virginica* Gmelin. Besides some fresh-water shells from Iowa the Museum received from Mr. R. Ellsworth Call specimens of a singular parasite of the land shell *Succinea obliqua*. This parasite *Leucochloridium americanum* is a new species of a genus hitherto unknown to North America, and first characterized from a single species infesting *Succinea* in France. The French species is described by Carus and figured in the Journal de Conchyliologie (vol. XXVII, pl. x, fig. 6) for 1879. It is the larva of *Distoma macrostoma* Zeller, and develops in the intestines of thrushes, nightingales, and other birds which eat the *Succinea*. It is long and slender and of a pale apple-green with blackish maculations near the larger end. The American species is larger, proportionally stouter, and of a rusty brown where the European species is green. It is highly probable that if the naturalists of Iowa examine the intestines of the robin or other coarse-feeding singing birds of that State they will find the fully developed *Distoma* corresponding to this species.

The quality of the accessions in general has been good, only ten of the fifty-two proving valueless to the Museum.

The routine work of the year has largely been spent on the general series of exotic mollusca, of which a large proportion has been revised; on the East American gastropods, including those of the Antillean region and thence northward to Cape Hatteras, of which chiefly the *Pleurotomidae* and *Solenocoencha* remain to be revised, and the miocene and pliocene tertiary fauna of the United States, especially the deposits examined last year and to some extent this year, on the west coast of Florida, from Tampa southward. Work on the gastropods of the Blake expedition has been continued in connection with the review of the East American forms above referred to. Information or assistance of more or less importance was furnished to the following persons, among others, the correspondence often including several letters, and the identification of material consuming the available part of several days of labor.

Prof. Alex. Agassiz, Cambridge, Massachusetts; Mr. C. E. Beecher, New Haven, Connecticut; Dr. Stephen Bowers, San Buenaventura, California; Dr. J. G. Cooper, Haywards, Colorado; Dr. Geo. M. Dawson, Ottawa, Ontario; Mr. R. T. Jackson, Cambridge, Massachusetts; Mr. J. G. Henderson, Carrollton, Illinois; Dr. Paul Pelseneer, Brussels, Belgium; Mr. H. A. Pilsbry, Philadelphia, Pennsylvania; Mr. H. Hemphill, San Diego, California; Lieut. J. F. Moser, U. S. Navy; Dr. W. H. Rush, U. S. Navy; Mr. Chas. T. Simpson, Ogallala, Nebraska; Mr. J. H. Singley, Giddings, Texas; Dr. V. Sterki, New Philadelphia, Ohio; Mr. J. L. Tilton, Middletown, Connecticut; Mr. R. P. Whitfield, New York City; Mr. B. H. Wright, Penn Yan, New York.

The limited time for research afforded by the duties of the curator has been devoted (1) to investigations in regard to the deep-sea mollusks collected by the *Blake* and *Albatross* on the eastern coast of the United States and the Antilles; (2) to a study of the fauna of the Miocene siliceous beds of Tampa Bay, Florida, and of the Pliocene of south Florida, and (3) to the relations of the members of the Tertiary mollusk fauna with the recent species of the coast.

The papers published during the year 1887-'88 by the curator and his associates are noticed in the Bibliography, section IV of the Report.

In previous reports I have stated why it is impossible to give the exact number of specimens, species, duplicates, etc., contained in the collection. In my last report (1886-'87) I made the rough estimate that the collection contained 425,000 specimens of all sorts. Since that time about 30,000 specimens have been received. The total number of entries in the Museum register or catalogue for 1886-'87 was 10,530, while for 1887-'88 the number is 11,804. Had we had adequate clerical assistance the number might easily have been doubled. As it is it represents about 35,000 separate specimens, classified, labeled, arranged, and entered in the register. Omitting a series of about 1,500 duplicate entries which was made by Dr. Lewis in 1876 in revising the *Unionidae* belonging to the National Collection, and all numbers assigned to Professor Verrill for his use in cataloguing the Fish Commission dredgings, and of which the entries have not yet been reported to this department, though in his possession for use in due course, the total number of registrations to date is 81,911, representing about 250,000 specimens, which have been administered upon, and for the most part are arranged in such a way as to be accessible for study. The largest collection outside of the National Museum in this country is supposed to be that of the Philadelphia Academy of Natural Sciences, and they are reported to possess about 52,000 trays or lots, corresponding to our registration numbers, or 156,000 registered specimens, against 250,000 in the National Museum, in round numbers. But when we reflect that only one-eighth of the Jeffreys collection has been registered, none of the Arctic-Alaskan collection, and but a very small part of the Antillean collection of the Fish Commission, or of the Lea collection, it is evident,

leaving duplicates out of the computation altogether, that the discrepancy is much greater than the above figures would convey. Without being able to give exact figures, I have no hesitation in stating that it is probable our mollusk-collection is twice as large as any other American collection and larger than any European collection. " In point of the number of original types it contains it will stand second only to the collection in the British Museum, and in the fullness of the accompanying data and the scientific value of the material contained in it I have no doubt it is the equal, if not the superior, so far as recent mollusks are concerned, of any collection in the world. It has the best faunal collection in existence of the British mollusca, of the mollusks of the North Atlantic sea-bed, of the American Arctic regions, of the East and West North American coasts, and of the interior land and fresh water fauna of North America. Notwithstanding all this there are many gaps to be filled, especially in exotic species, but not until all arrearages are cleared up and we know exactly how we stand can we use judiciously the large and valuable supplies of duplicate material in our possession.

The schedule showing the progress of registration during the past year is annexed.

Vol.	From—	To—	Total.	Remarks.
XV	68,151	.....	.....	Reserved for Fish Commission.
XVI	77,877	78,000	124	Volume filled.
XVII	78,973	.....	.....	Reserved for Fish Commission.
XVIII	83,535	87,302	3,768	Volume not filled.
XIX	87,851	92,800	4,950	Volume filled.
XX	92,801	94,585	1,785	Volume not filled.
XXI	97,501	98,677	1,177	Do.
Total..	.....	.....	11,804	

REPORT ON THE DEPARTMENT OF INSECTS IN THE U. S. NATIONAL MUSEUM, 1888.

By DR. C. V. RILEY, *Honorary Curator.*

Considerable progress has been made during the past year in the arrangement of material, and much more could have been made but for the crowded condition of the laboratory, which makes it impossible to expand and properly arrange the collections. Additional room is sadly needed, and I earnestly urge that in some way it be obtained.

During the early part of the year a beginning was made in the arrangement of the Coleoptera, and at intervals this has been continued until all available space is occupied and but the smallest part of the material worked up. Later some of the large Bombycid Lepidoptera were arranged in cabinet drawers so far as these held out. In some of the genera of the Noctuidæ studies were made of the material arranged. In the Diptera the Bombyliidæ were separated out and tentatively arranged, but there is no shelf room for the boxes, and they are piled up on the cabinets, reducing the working space, and much more exposed to infection from Museum pests. A very large part of the first half of the year was employed in annotating and critically overhauling the Glover plates with the view of possibly editing them for publication.

Early in 1888 a re-arrangement of the collections on the floor of the Museum gave the department a fair exhibition court, and the collections already prepared were removed thereto, and other boxes were prepared, so that we have at present a very fair exhibit collection on the floor of the Museum. Several table cases, affording considerable storage room, were also assigned to the department, and have been in large part filled.

A considerable proportion of the time was occupied in giving information about specimens sent, not only those of which accessions were made, but also of those which, although of no value whatever to the collection, are often much more troublesome, involving questions as to life habits, methods of collecting, and determinations.

About one hundred and fifty letters were written exclusive of the reports on accessions, and about twenty lots of species were determined for students and collectors.

Practically the entire month of June, 1888, was occupied in preparing for the Cincinnati exposition. And as the time was limited and no outside assistance obtainable, I had to draw on the divisional force of the Department of Agriculture to get the exhibit ready in time. Indeed the amount of work to be done in arranging our extensive collection is so great that I earnestly recommend the appointment of an additional assistant.

The accessions during the year numbered but fifty-eight against one hundred and two during the previous year. The apparent falling off is entirely accounted for by the fact that during the summer of 1886 and spring of 1887 a very large number of specimens of *Belostoma americana* and *Dynastes tityus* were received, these species appearing in abnormal quantities in several portions of our territory. This year for some reason these insects are much less abundant and attracted no general attention, and hence the apparent decrease in number of accessions received.

As a matter of fact the number of receipts of real value are fully equal to those of the previous year, and, as before, many species and specimens were added by myself and assistants, of which no formal record was made. Indeed, as in previous years, by far the largest amount of valuable material has been added as the result of my work as United States entomologist. These collections come from the various field agents of the Department of Agriculture and those made by Mr. Albert Koebele, of Alameda, California, Mr. D. W. Coquillett, of Los Angeles, California, and by Mr. Lawrence Bruner, of West Point, Nebraska, are particularly worthy of mention. These, with the constant material that daily comes to the Division of Entomology from its correspondents, have been turned over by me without special accession numbers, and I mention them particularly here because the permanent numbered accessions give no sort of idea of the rich additions which are constantly being made to our collections. In the future I hope to have the work so systematized that I can indicate the more important of these additions by accession number.

The following is a list of the more important numbered accessions, which represent many hundreds of specimens:

In August one specimen *Acanthocinus nodosus* from Robert A. Mills, Chuluota, Florida. No. 19,478. The specimen was a fine one and was very acceptable, though the species is represented in our collections.

In September there was added a vial of winged *Termites* from R. Hitchcock, Osaka, Japan. No. 19,302. Interesting from their locality, and for comparison with our own species.

Eighteen vials of *Arachnida* and *Myriopoda* from Macon, Georgia, collected by L. M. Underwood. No. 19,526.

Six vials of *Arachnida* and *Myriopoda* from Indian Springs, Georgia, collected by L. M. Underwood. No. 19,533.

Six vials of *Arachnida* and *Myriopoda* from Georgia, collected by L. M. Underwood. No. 19,542. Prof. L. M. Underwood, of Syracuse, New York, was for two months—August and September, 1887—in the employ of the Department as a collector of

Arachnida and *Myriopoda*, and his collections, made principally in Georgia, are of great interest, and add very largely to the Museum collection in these classes.

Eight species of *Orthoptera* and *Neuroptera* were from E. A. Schwarz, Washington, District of Columbia, collected at Cocoanut Grove, Florida. No. 19,535. Principal among these was a specimen of *Oligotoma hubbardi* of the Neuropterous family *Embiidae*, a very rare species.

Seven specimens of 4 species of *Callimorpha* from Mr. H. F. Schoenborn, Washington, District of Columbia. No. 18,565. These are valuable as varieties not represented in the Museum collection or as very fine specimens.

In October, 263 species in 729 specimens of *Syrphidae* from Dr. S. W. Williston, New Haven, Connecticut. No. 19,702. These are the types of Bulletin U. S. National Museum 31, mentioned in the last report. The collection is almost complete, and by all odds the best collection of the family extant. The material of the Museum from other sources will be added and arranged as soon as practicable. This is the most valuable accession of the year.

In November a lot of *Myriopoda* and *Arachnida*, Virginia and New York, from L. M. Underwood. No. 19,758. This contained the balance of the material collected by Professor Underwood while in the employ of the Museum.

Miscellaneous lot of insects from Truxillo, Honduras, collected by Chas. H. Townsend, U. S. National Museum. No. 19,811. Contained a considerable number of bright and attractive species, representing some of the more common species of the locality.

In January a lot of Central American *Longicornia* and *Carabidae*, determined by H. W. Bates, from Messrs. Godman & Salvin, 10 Chandos Street, Cavendish Square, London, England. No. 20,007. This is a valuable lot of insects, typical of many of the species described in the *Biologia Centrali Americana*, and forming in the two families represented an excellent nucleus for a Central American collection.

Also a large lot of unmounted Madagascar Coleoptera from Edward Bartlett, Maidstone, Kent, England (through Robert Ridgway). No. 20,093. Valuable as being the first representation of the insects of this region. The specimens have not yet been mounted.

In February, 14 new species of Myriopods from C. H. Bollman, Bloomington, Indiana. No. 20,155. Types of species described in the Proceedings of the U. S. National Museum.

In March, 133 specimens of 36 species of Diptera from D. W. Coquillett, Los Angeles, California, through the Curator. No. 20,336. This lot contained mostly Bombyliidae from California or adjacent localities, and very largely typical of species described by Mr. Coquillett.

In April a small lot of Lepidoptera from State Laboratory of Natural History, Champaign, Illinois. No. 20,395. Quite a series of fine specimens were sent on for determination by the above institution, from which several very good species were obtained for the Museum.

In May, 3 species in 7 specimens of *Lachnosterna* from E. A. Schwarz, Washington, District of Columbia. No. 20,639. Florida species, not represented in our collection, and obtained in exchange.

The larger part of the routine work is the care and preservation of the collections. In no other department perhaps is there as much danger of injury from Museum pests or more care and time required to keep up the character of specimens. The time thus spent shows very little apparent result. The mounting and placing of accessions and work of preparation also takes up a large portion of time.

Still a great deal has been accomplished in the line of systematic arrangement of both exhibit and study series, the general review of which will be found in the beginning of this Report.

In the autumn and early winter the curator made another trip to Europe, taking with him a number of interesting and undetermined species, especially among the Micro-lepidoptera, for determination and comparison. A number of correspondents and specialists were met and a number of notes in some of the largest museums were made.

In August, 1887, both the curator and the assistant curator, Mr. J. B. Smith, attended the meeting of the American Association for the Advancement of Science at New York City. Mr. Smith took with him a series of the undetermined *Geometridæ* in the Museum collection for comparison with the New York collections, and nearly all of these were determined.

During this trip quite a number of collections were examined by Mr. Smith, and some good material was obtained for our collection.

A large lot of material was received through the curator from the Department of Agriculture, and its proper disposition occupied considerable time.

During September the curator was absent in Europe, while the assistant was on leave during the greater portion of the month. The time available was entirely devoted to overhauling the collection, to correspondence, and to placing the material received, which was unusually abundant.

During the month of October the Williston collection of *Syrphidæ* was received at the Museum, and this, containing 263 species in 729 specimens, was carefully gone over, checked, and general condition noted.

The *Sphingidæ* or Hawk Moths were re-arranged in conformity with a monograph which Mr. Smith has been preparing and which is referred to later on.

The series contains 69 species in 250 specimens. The duplicates were also arranged and formed a series of 39 species in 167 specimens, the majority of which, however, were used later in the exhibit series.

In the same family the biologic material was also arranged, and illustrates more or less completely 27 species. There are 64 imagines, 60 blown larvæ, 23 pupæ, and 34 vials, containing upwards of 50 specimens of larvæ and eggs. Altogether about 231 specimens in the series. There are, in addition, a series of, as yet, undetermined larvæ.

In the Coleoptera the family *Cicindelidæ* was classified and arranged in seven boxes. The collection contains 99 species and varieties in 713 specimens, and is therefore an extremely rich one.

A duplicate series, formed at the same time, shows 47 species and varieties in 747 specimens.

In November an unusual number of species for determination were received from correspondents of the Museum, from some of which good material was obtained for our collection.

In the Orthoptera the unnamed material in *Acrididæ* was selected out and sent to Mr. Lawrence Bruner, of West Point, Nebraska, for

study, at his request. This material was returned later, with some additions new to the collection.

In Coleoptera the systematic arrangement has been continued, and nine of the Carabid genera were arranged in eight boxes. Thus far 83 species and varieties are represented, and the material has not yet been entirely sifted. The extreme wealth of material, the number of the collections among which it is scattered, and the small size of some of the species renders the task of arrangement a slow one.

In the Lepidoptera the family *Saturniidae* has been arranged in five cabinet drawers. We have 17 species in 58 specimens, and but 4 species are needed to complete the family. Of duplicates we have 7 species in 47 specimens, a large proportion of which were subsequently used in the exhibit series.

From Dr. Marx, of the Department of Agriculture, were received one hundred and twenty-six vials of named *Arachnida*, many of them specimens which had been previously turned over to him for study, but quite a number of which were donated by him. These were all mounted on vial blocks and temporarily arranged.

Considerable time was spent in going over a portion of the collection for Museum pests.

During December the work of thoroughly examining the collection was completed and the ordinary routine matters attended to.

In January, 1888, the re-arrangement of material on the floor of the Museum placed a court at the disposal of this Department for exhibit purposes. What had already been prepared was moved into this new space, and work was vigorously prosecuted on a series of exhibition boxes, some of which were completed, but none placed, owing to the lack of cases. A very fair show, however, was made with the space and material at our command.

Some of the Lepidopterous family *Noctuidae* were placed in cabinet drawers, and a small amount of systematic work done.

In February, 1888, two boxes of American butterflies were completed and placed on exhibition. The assignment of additional table cases to this department added considerably to our storage room and much material was transferred from the laboratory to these cases.

The Coleoptera were carefully sifted for material in *Lachnosterna*, which was roughly arranged, and a selected series sent to Dr. George H. Horn, of Philadelphia, for study.

A large lot of Diptera, principally *Bombyliidae*, and many typical, were received from Mr. D. W. Coquillett, one of my agents at Los Angeles, California, and turned over to the department.

In March, six additional boxes for the exhibition series were prepared and put on public view.

The Bombyliid material received last month suggested an overhauling of our material in the family, which was begun.

In April the work on the *Bombyliidae* was continued and completed.

Twenty-four boxes are used in the arrangement and there are nearly four boxes of duplicate material. The collection in this family is extremely rich, as I have been especially interested in it since my studies of the enemies of the Rocky Mountain locust began. Efforts will be made to have it monographically studied.

The material in *Lachnosterna* having been returned by Dr. Horn, its arrangement was begun. Six additional boxes were prepared and placed on exhibition.

The month of May was devoted to the study of our material in *Lachnosterna*, which was very largely augmented by the efforts of Mr. Smith and of my assistants in the Department of Agriculture, Messrs. Schwarz, Pergande, and Alwood, who collected many thousands of specimens of the local species.

Almost the entire month of June was employed directly or indirectly in preparing a series of boxes for the exposition at Cincinnati, Ohio, and forty-eight boxes were completed and sent off. In this work Dr. George Marx prepared the *Arachnida*, and Mr. Tyler Townsend, assigned from the Department of Agriculture, assisted during a portion of the month in the work of preparation.

This series, entirely unique and, so far as completed, of great educational value, is in effect a classification of the entire Insecta illustrated by the specimens themselves and by drawings. Twenty-eight boxes, containing 559 species in 1,684 specimens and 683 drawings, were made up. Eight boxes, also belonging to the series, but previously prepared, contained 571 species in 2,410 specimens and 257 drawings. In all, this series contains 1,130 species, 4,094 specimens, and 920 drawings, representing all orders save the Hemiptera, the Diptera, and the Hymenoptera.

There were also sent from the general exhibit series eight boxes of forestry insects and four boxes of insects affecting cultivated plants, the number of specimens in which can not readily be estimated and were not counted.

The assistant curator has during the year been quite active in original work largely connected with the arrangement of the Museum material. This has been chiefly in Lepidoptera, and will be indicated in detail in the list of writings.

In the *Sphingidæ* he has completed his studies for the monograph long since begun. This is an important paper, which should have been published as a bulletin of the Department, and I regret that, because of the inevitable delay in getting it out from the Government Printing Office, Mr. Smith chose to publish it in the proceedings of the American Entomological Society.

In the arrangement of the *Arctiidæ* Mr. Smith made some critical notes on the species of *Arctia*, the results of which were presented to the American Association for the Advancement of Science at the New York meeting. He has also made some extremely interesting notes on the genus *Lachnosterna*, which are not yet in shape for publication.

The monograph of the Noctuidæ, referred to in the previous report, has received some small additions, several genera having been studied, among them *Homohadena* and *Oncocnemis*.

The papers published by the assistant curator and myself, as well as by other collaborators of the Museum, are noticed in the bibliography, the closing part of the report.

I would refer to the last annual report for a statement of the condition of the collections, which, with the preceding statement of what has been done during the year, will give a very good idea of their present state. There have been added during the year, chiefly from California, probably some ten thousand specimens, including many additional species and some very valuable study material.

A very large increase has been made in the exhibit series, but the present state of that series, broken as it is in preparing for Cincinnati, has made an enumeration impracticable.

The last catalogue entry for June, 1887, was 349, and the last entry for June, 1888, is 405.

REPORT ON THE DEPARTMENT OF MARINE INVERTEBRATES IN THE U. S. NATIONAL MUSEUM, 1888.

By RICHARD RATHBUN, *Honorary Curator.*

During the past year the curator has been able to give less attention than usual to the affairs of this department in consequence of his increased duties in connection with the Fish Commission. The repairs in progress during most of the year at the western end of the Smithsonian Institution, where all the specimens under his charge are stored, have also tended to interfere with the work upon collections, and necessitated the closing of the exhibition hall to the public. The accessions have been fewer in number, and the quantity of material received has been much less than for several years past. This was due in large part to the fact that comparatively few explorations were made by the Fish Commission during the spring and summer, and that since the reorganization of the latter bureau in the winter the collections of marine invertebrates made by the field parties have been retained by the commission pending their examination and description. The current work of the department has, however, been kept up and the collections have been maintained in good condition but no attempt was made to enlarge the exhibition series, although we now have the means of greatly improving its character and appearance through recent accessions to the department.

While giving almost all his time to the business of the Fish Commission, by retaining his office and work-rooms at the Museum, the curator has found it possible to exercise general supervision over the collections in his care. His investigations, however, have related chiefly to subjects having a more or less direct bearing upon the practical problems before the Commission, and have had little reference to the Museum collections. There is, consequently, but slight progress to report, either in the classification of specimens and the enlargement of the study series or in the selection of duplicates for exchange. Prof. A. E. Verrill has continued to administer upon the Fish Commission collections at Yale College, which are in the custody of the Museum.

Very extensive and important natural history results were accomplished by the Fish Commission during the year, especially on the voyage of the steamer *Albatross* from Norfolk, Virginia, to San Francisco,

which occupied about six months. The large collections of marine invertebrates made during this trip will not directly benefit the Museum, but it is expected that the type series of each group will be transferred to its keeping as fast as they are studied and described. There have been no important explorations besides those of the Fish Commission which have contributed to our stores.

Duplicate sets belonging to Series IV, prepared some time ago, have been distributed to twenty-two institutions of learning located in different parts of the country, but no additional sets of the same character have been made up during the year.

Thirty-three accessions were received by this department during the year, of which seventeen were contributed by or through the United States Fish Commission. A much smaller quantity of material than usual was sent in from the Wood's Holl Station, the steamer *Albatross* having made only a single dredging trip during the summer, and the inshore work of the steamer *Fish Hawk* having afforded comparatively few specimens that were considered of sufficient importance for permanent preservation in the Museum. The *Albatross* collection was, however, obtained chiefly from deep water, and contained many rare forms. The cruise of the schooner *Grampus* to the Gulf of St. Lawrence and to the outer coast of Newfoundland, during the summer, also yielded an interesting though small lot of specimens, mostly crustaceans and echinoderms, which were collected on the shores and by the use of the surface net. The collections made in the vicinity of Wood's Holl, Massachusetts, by Mr. Vinal N. Edwards, from October to June, were of special value, consisting for the most part of the internal and external parasites of fishes and of surface towings. Several contributions were received from the Gloucester fishermen, the most important being a large and fine specimen of the tree coral, *Paragorgia arborea*, from a depth of 200 fathoms, off Banquereau. This specimen forms a valuable addition to the exhibition series of the Museum, having greater spread and being in a better state of preservation than any now in the cases. Among other donations from the Fish Commission worthy of mention are a series of crustaceans obtained in the vicinity of Great Egg Harbor, New Jersey, by Dr. T. H. Bean, and a number of parasites of the striped bass, collected in Virginia by Mr. S. G. Worth.

From Mr. N. Grebnitzky, of Bering Island, eastern Siberia, there was received a very important addition to his collection of two years ago, consisting chiefly of small species of crustaceans, worms, echinoderms, and sponges, from Bering Island. Dr. P. Herbert Carpenter, of Eton College, England, has contributed well preserved specimens of two species of crinoids which are new to our collection, namely, *Pentacrinus Wyville-Thomsoni*, from the Eastern Atlantic, and *Antedon phalangium*, from the coast of Tunis, both collected in 1870, by H. B. M. S. *Porcupine*. Many specimens of *Gammarus* and two specimens of leeches, collected in Missouri, were presented by Mr. R. Ellsworth Call, and a spec-

imen of *Sebastes marinus* infested with a new and large species of lernæan parasite, was received from Mr. E. G. Blackford, of New York.

As elsewhere explained, the curator and his two assistants were at Wood's Holl, Massachusetts, from early in July until the first part of October; but although the work there in hand was connected directly with the investigations of the Fish Commission, it consisted in large part of the assorting and preservation of collections which in the autumn were transferred to the custody of the National Museum. Mr. A. H. Baldwin, who had been employed in the department during the previous two years, resigned his position in October, and for the remainder of the year the curator was assisted only by Miss M. J. Rathbun. Being obliged to give nearly all of his time to Fish Commission duties, the curator has but little progress to record either in the arrangement and classification of the collections or in the enlargement of the exhibition series. The current work was, however, promptly attended to, and all collections received were assorted, catalogued, and properly cared for. The extensive alterations in connection with the fire-proofing of a part of the west end of the Smithsonian Institution, which continued during nearly the entire year, greatly interfered with the work of the department and necessitated our vacating for that time about one-half of the space allotted to the alcoholic collections of marine invertebrates. The main part of the collections being thus crowded together in a much smaller area than they ordinarily occupied, it was impossible to give them all the care they required, but no serious losses appear to have been sustained during this period. Before the close of the year the small room and hall space assigned to this department in the west basement had been refitted with cases and the specimens were being returned to their old quarters. No changes have been made in the gallery of the main hall, where the dried specimens are stored. The exhibition hall has necessarily been closed to the public, in consequence of the repairs to the fish hall through which access to it is gained.

A small representative series of specimens was supplied to Mr. Frederick A. Lucas as the nucleus of a synoptical collection of marine invertebrates, which was exhibited in part at the Cincinnati Centennial Exposition during the summer of 1888.

The greater part of the routine work, including the sorting and cataloging of collections and the supervision of the alcoholic specimens, which require constant attention to insure their safety, has devolved upon Miss Rathbun, to whom credit is chiefly due for the excellent condition of the department at the end of the fiscal year.

The following is a statement of the amount of cataloguing done during the fiscal year ending June 30, 1888:

Name of group.	Entries to June 30, 1887.	Entries to June 30, 1888.	Entries made during the year.
Crustaceans.....	12, 606	13, 110	504
Worms.....	3, 963	4, 173	210
Bryozoans and Ascidians.....	959	960	50
	2, 500	2, 549	
Echinoderms and Cœlenterates.....	16, 183	16, 409	226
Sponges and Protozoans.....	5, 431	5, 444	31
	4, 955	4, 973	
Total.....			1, 021

While at Wood's Holl, during the summer of 1887, the curator continued his studies upon the crustacean parasites of the fishes of that region, completing the descriptions and drawings of several species which have been submitted for publication in the proceedings of the Museum. Reports upon the genus *Heliaster* of starfishes, and the genera *Porites* and *Synaræa*, of corals, have been finished and published during the year. The curator has also found time to examine and report upon the interesting collection of surface towings made by the Fish Commission schooner *Grampus* during the spring of 1887, on the early mackerel grounds. The study of this material, which consists for the most part of very small organisms, belonging to several groups of invertebrates, and constituting the food of the mackerel, was considered to be of considerable importance, as changes in its abundance and character from year to year, taken in connection with the changes in temperature, may throw some light on the movements of that important market fish. No general deductions can be drawn, however, from the study of the collections made in one season only, but it is proposed to continue the investigations during subsequent years, and a similar collection was made by the *Grampus* in the spring of 1888. It has not yet been carefully examined.

It may not be out of place in this connection to mention the set of temperature charts now in course of preparation for the Fish Commission, and covering long series of observations made at over seventy-five stations of the Light-House Board and Signal Service. These stations are distributed along both the Atlantic and Pacific coasts of the United States and the Great Lakes, and some are located on important rivers. These observations are being reduced and plotted for the purpose of obtaining positive information respecting the water temperatures as influencing the movements of the principal commercial fishes, but it is expected that they will also prove of interest in connection with the study of all marine and fresh-water animals and plants.

There have been several collaborators of the Museum located at other institutions as in former years. Prof. A. E. Verrill, at Yale College, has continued his studies upon several groups of marine invertebrates from the dredgings of the Fish Commission, on the eastern coast of the United States, and has been assisted by Miss K. J. Bush. Prof. S. I. Smith, also of Yale College, has been at work upon the crustacea derived from the same source. Prof. Edwin Linton, of Washington and Jefferson College, Pennsylvania, has made rapid progress with his studies of the Trematode parasites of fishes, mainly collected by himself at the Wood's Holl Station, being assisted in the preparation of his plates by Mrs. Linton. A second large report upon the subject was nearly completed at the close of the year. Prof. Leslie A. Lee's work upon the foraminifera of the Fish Commission has been deferred for a time, in consequence of his acting as chief naturalist of the steamer *Albatross* during the cruise from Norfolk to San Francisco. Mr. J. Walter Fewkes, of the Museum of Comparative Zoology, Cambridge, has continued to report upon the free Medusæ collected by the *Albatross*.

As it has been the custom hitherto to transfer most of the natural history collections made by the vessels and field parties of the Fish Commission directly to the custody of the National Museum, where they could be safely cared for without additional expense to the Commission, it has been deemed appropriate to give in each of these annual reports a brief account of the explorations in the course of which the materials were obtained. As recording the origin and general character of the specimens made available for scientific study by the investigations of the Commission, these accounts, it was supposed, could not fail to be of interest and value to those who desired to consult the collections. During the past fiscal year, with the death of Professor Baird and the placing of the National Museum and the Fish Commission under separate management, the policy of the Commission with respect to its collections of marine animals has been modified, and they will be retained in its possession until finally worked up and described. The first or principal series of specimens will then, however, become the property of the Museum, and the expediency of reporting upon the explorations in this connection seems therefore as urgent as before.

The steamer *Albatross* was prevented, in consequence of the extensive preparations necessary for her cruise to the Pacific Ocean, from engaging in any investigations before the middle of September, and at that time only a single trip was attempted between Chesapeake Bay and Wood's Holl. This trip was also planned practically for the purpose of testing her new boilers, but during the voyage a line of twelve dredgings with the beam trawl was successfully made in depths of 102 to 1,276 fathoms, along the outer edge of the submerged continental plateau and the inner part of the Gulf Stream. The collections obtained were landed and examined at Wood's Holl, and in the fall were sent in part to the

National Museum, and in part to Professors Verrill and Smith, at Yale College, for further study. After remaining about a month at Wood's Holl to complete repairs, the *Albatross* returned to Washington, and on November 21 left Norfolk on the long contemplated trip to the North Pacific Ocean. The steamer was in command of Lieut. Commander Z. L. Tanner, U. S. Navy, as heretofore, with Prof. Leslie A. Lee in charge of the civilian scientific staff, assisted by Mr. Thomas Lee and Mr. Charles H. Townsend, as naturalists, and Mr. Dennis Cole, as preparator. In view of the interesting character of the region through which the steamer would pass on the voyage of several months, it was planned to have her undertake as much scientific work on the way as could be accomplished without unduly prolonging the cruise or preventing the steamer arriving at San Francisco in time for the summer explorations on the northern coasts. Dredgings were to be made occasionally, and the naturalists were to be allowed to make collections at each of the coaling ports, as well as at a few other localities, paying special attention, however, to the economic fishes and fishery methods, wherever they stopped. The following places were visited, and at nearly all of them large quantities of valuable material bearing upon the natural history of the region were obtained: The island of Santa Lucia, in the West Indies; Bahia, the Abrolhos Islands, Montevideo; Sandy Point, and other localities in the Straits of Magellan; Lota, Panama, the Galapagos Islands, Acapulco, and La Paz. A series of dredgings was carried through the Straits of Magellan, the inland passage being made from the eastern entrance to Port Otway, Chili. The trip to the Galapagos Islands was attended with very successful results, and in addition to a large miscellaneous collection of marine and land animals and plants made there, the naturalists secured fourteen living specimens of the interesting land tortoises which are peculiar to those islands, where they are now becoming exceedingly rare. They were transported safely to San Francisco and are now in the zoological garden of the National Museum at Washington. Collections of the shore fishes of the outer coast of Lower California were also obtained by seining at several places.

The total number of dredging stations made during the voyage was ninety-one, the depths of water ranging from $5\frac{1}{2}$ to 1,379 fathoms. Twenty-four stations, with depths of 10 to 1,019 fathoms, were in the Atlantic Ocean between the West Indies and the eastern entrance to the Straits of Magellan; fifteen, with depths of 17 to 449 fathoms, were in the Straits of Magellan; and fifty-two, with depths of $5\frac{1}{2}$ to 1,379 fathoms, were in the Pacific Ocean between Port Otway and San Francisco.

The *Albatross* arrived at San Francisco May 14, and at once began preparations for the Alaskan cruise, on which she sailed July 4. The collections made during the voyage from Norfolk to San Francisco were shipped overland to Washington. They filled over one hundred large cases, and were received in the very best condition. The fishes, marine

invertebrates and algæ, will be assigned by the Fish Commissioner to several experts for examination and report. The miscellaneous collections, obtained incidentally during the cruise, and containing many specimens of birds, reptiles, insects, plants, ethnology, etc., have been transferred directly to the National Museum.

The Fish Commission steamer *Fish Hawk* was at Wood's Holl during a part of the summer, assisting in the scientific investigations being carried on at that place, but her collections contained comparatively few specimens which it was thought advisable to preserve for permanent keeping in the National Museum. During the same season, the schooner *Grampus* proceeded along the coast of the British Provinces as far as Labrador, visiting both the Gulf of St. Lawrence and the outer coast of Newfoundland, in quest of information respecting the movements and abundance of the mackerel which were said to have reappeared on the northeastern coast of the latter island. Mr. F. A. Lucas and Mr. William Palmer, of the National Museum, accompanied the *Grampus* as naturalists, making collections of marine and land animals whenever the opportunity occurred. In the spring of 1888 the *Grampus* repeated its cruise of the previous year on the early mackerel grounds, between Cape Hatteras and Cape Cod, Dr. T. H. Bean acting as naturalist. The work continued from about April 1 to near the end of the year. The most important zoological results were obtained by means of towing nets which were kept constantly in use, skimming the surface of the ocean, and securing large quantities of young fishes, fish eggs, and invertebrates, the latter forming the principal food of the mackerel. This collection has not yet been reported upon, and it is, therefore, impossible at present to describe its contents or value. The floating fish eggs, which were taken in immense numbers, were placed in the hatching apparatus on board the schooner and some of the spawn was subsequently transferred to the Wood's Holl laboratory. Many embryos were reared to different ages, and preserved for future examination and identification.

The Wood's Holl Station was occupied as usual during the summer months, or from the 1st of July, until October, for the purposes of scientific investigation. The composition of the party was nearly the same as in 1886. Professor Baird was there in the beginning, but too ill to give more than the most general directions. While he lived, Maj. T. B. Ferguson, the Assistant Commissioner, assumed charge of operations, and after his death, in August, the work was directed from Washington by Professor G. Brown Goode.

Prof. A. E. Verrill was in charge of the laboratory, assisted by Mr. Richard Rathbun, who attended to the routine duties in connection with the administration of the work. The scientific staff in the service of the Commission consisted of Prof. S. I. Smith, of Yale College; Dr. J. H. Kidder, of Washington; Prof. Leslie A. Lee, of Bowdoin College; Prof. Edwin Linton, of Washington and Jefferson College; Mr. Sanderson Smith, of New York; Mr. Thomas Lee, of the steamer

Albatross; Mr. B. F. Koons, of the Storrs Agricultural School; Mr. J. H. Blake, of Cambridge, as artist; Mr. Peter Parker, Mr. A. H. Baldwin, and Miss M. J. Rathbun, of Washington; and Miss K. J. Bush and Miss C. E. Bush, assistants of Professor Verrill. The aquaria which were made an important and valuable feature of the laboratory, were under the management of Mr. William P. Seal. Tables in the laboratory were also occupied by Dr. Osler, of Philadelphia, Mr. Sho Watase, of Johns Hopkins University, and Mr. Miyabe, of Harvard University.

Mr. Vinal N. Edwards assisted in procuring specimens for the use of the scientific party during the summer, and continued his collecting through the remainder of the year, securing valuable materials in those seasons when the station is seldom visited by the professional naturalist. In addition to the explorations made by the steamers a great deal of seining for shore fishes was done in the vicinity of the station under the direction of Mr. Thomas Lee.

DISTRIBUTION OF DUPLICATES.

The following institutions have been supplied with sets of marine invertebrates, belonging to duplicate series No. IV, the character and preparation of which have been described in former reports :

Greenup Chapter of the Agassiz Association, Greenup, Kentucky.
 University of North Dakota, Grand Forks, Dakota.
 State Agricultural and Mechanical College, Auburn, Alabama.
 Hamline University, Hamline, Minnesota.
 Randolph Macon College, Ashland, Virginia.
 Alma College, Alma, Michigan.
 Wallis School, Peabody, Massachusetts.
 Lake Forest University, Lake Forest, Illinois.
 West Des Moines High School, Des Moines, Iowa.
 State Normal School of Nebraska, Peru, Nemaha County, Nebraska.
 University of Alabama, Tuscaloosa, Alabama.
 Lake High School, Lake, Cooke County, Illinois.
 Baker University, Baldwin, Kansas.
 High School, Emporia, Kansas.
 Agricultural College, Ames, Iowa.
 Cushing Academy, Ashburnham, Massachusetts.
 University of Notre Dame, Notre Dame, Indiana.
 Oswego College, Oswego, Kansas.
 Packer Collegiate Institute, Brooklyn, New York.
 McPherson College, McPherson, Kansas.
 Wilson Female College, Chambersburg, Pennsylvania.
 Howard University, Washington, District of Columbia.

The above sets were made up from collections obtained by the U. S. Fish Commission on the eastern coast of the United States, and contained about one hundred and ten species each, representing all the principal groups of marine invertebrates found in that region. In addition to these a few small special sets, consisting of only a limited amount of material each, have been furnished to teachers and special investigators.

REPORT ON THE DEPARTMENT OF COMPARATIVE ANATOMY IN THE U. S. NATIONAL MUSEUM, 1888.

By FREDERICK W. TRUE, *Acting Curator.*

The care of the large amount of osteological material on hand and constantly being received, and the work of rendering it available for study, are together sufficient to fully occupy the time of the preparator, and it has consequently been impossible to prepare for study or for exhibition purposes any other class of material.

It is intended, however, that the department shall eventually be in every sense a department of comparative anatomy, and as fast as practicable steps will be taken towards that end.

The accessions during the year, indicated by the numbers in the osteological catalogue, were: Mammals, 305; birds, 227; reptiles, 3; fishes, 1; a total of 536. A large number of these were of common but desirable species, needed for the study series.

A fine collection of skulls of small mammals was received from Dr. J. C. Merrill, U. S. Army, skeletons of male and female orangs were obtained by exchange, and a skeleton of the pygmy sperm whale was presented by the U. S. Life-Saving Service.

Some bones of the extinct Dodo (*Didus ineptus*), and Solitaire (*Pezophaps solitarius*), were received from the Cambridge University Museum, England, and a large collection of bones of the extinct Great Auk were secured by Mr. Lucas, who was detailed to accompany the U. S. Fish Commission schooner *Grampus* on a voyage to the northeast coast of Newfoundland. Many skeletons of sea-birds were obtained during the same voyage. The collection of bones of the Great Auk contains the remains of several hundred individuals, and although from the length of time that has elapsed since the extermination of the Auk the majority are in a poor state of preservation, it is believed that the collection outranks all other collections of the kind.

From this material skeletons have been sent to the Museum of Comparative Zoology in Cambridge, Mass., and the American Museum of Natural History, New York.

The curator desires to acknowledge the continued courtesies of Mr. A. E. Brown, superintendent of the Philadelphia Zoological Society, Mr. W. A. Conklin, director of the Central Park Menagerie, and Dr.

C. Hart Merriam, Chief of the Bureau of Economic Ornithology in the Department of Agriculture.

For reasons given in the report of the osteological preparator, only twenty-five specimens have been added during the year to those previously on exhibition, but each one of these has filled some gap in the exhibition series.

Over one hundred and fifty specimens have been added to the study series, and the work of labeling and properly arranging the entire study series has progressed as steadily as possible with the force available.

During the year a large and valuable collection of birds and embryos of birds preserved in alcohol was transferred from the department of birds. It contains much interesting material, and a card catalogue of it, which is very much needed, will be undertaken at the earliest opportunity.

Printed labels for the specimens on exhibition have been supplied as fast as possible.

REPORT ON THE DEPARTMENT OF INVERTEBRATE FOSSILS (PALEOZOIC) IN THE U. S. NATIONAL MUSEUM, 1888.

By C. D. WALCOTT, *Honorary Curator.*

The main object of the year's work has been to prepare and place on exhibition a representative series of fossils from each of the larger divisions of the Paleozoic group of strata. This was accomplished in the preliminary arrangement of material in fifteen exhibition cases. The labeling of the species is tentative, as the material has not been critically reviewed owing to the desire to first have it all recorded and labeled as originally identified by the various parties who have had it in charge, either in private collections or in the collections of the Geological Surveys and those of the Smithsonian Institution. With few exceptions all of the old collections have been thus labeled.

There are now 10,955 specimens on exhibition, some of which will be replaced by better specimens; and new material will also be added from time to time.

The addition to the collections, as given in the list of accessions, Section v of the Report, shows a good growth, but not in proportion to the increase which will be secured from the Geological Survey the present year. There are now over ten thousand specimens to be studied and transferred. Over five thousand specimens were collected from typical localities of the Lower Silurian System, in New York and Vermont. As the Museum collections are very deficient in the fauna from this system of rocks, the addition will be of great value. A series of the specimens have, however, been placed in the exhibition cases, although not yet transferred from the Geological Survey to the Museum.

Dr. R. R. Gurley was absent in the field during the early part of the year collecting fossils in Tennessee. After his return and recovery from illness he worked on the collections until the close of the year.

In connection with the work of the Geological Survey I was absent from the city seven months of the year. When in the city my time

was given to looking after laboratory work and in the preparation of a paper on "The Taconic System of Emmons, and the use of the name Taconic in Geologic nomenclature." This study prevented the continuance of that of the Upper Cambrian Terrane. This latter will be resumed during the ensuing year.

I respectfully repeat the recommendation made in my report for the last fiscal year, "that a sum be set aside each year for the increase of the collection by purchase and by sending out collectors."

In the report for 1885-'86 a summary was given of the material in the collections, and in the report for the last fiscal year (1886-'87) the accessions were given. To that there are now to be added the accessions of the year just ended, which represent 158 specimens. The catalogue numbers taken up during the year are from 17,497 to 17,896, both inclusive.

The material selected for the exhibition series includes 10,955 specimens, as follows:

	Specimens.
Cambrian.....	1,331
Lower Silurian.....	2,736
Upper Silurian.....	1,711
Devonian.....	2,076
Carboniferous.....	3,101
	<hr/>
	10,955

The exhibition cases, thus far assigned to my department, do not furnish sufficient space for making a representative display of all the species; hence it has been planned to have a study and reference collection arranged in the drawers, beneath the cases. The duplicate specimens will be packed until storage cases can be secured for them.

The plan of arrangement of the exhibition series is zoologic, within certain geologic series of rocks; the first object being to show the stratigraphic succession of the faunas. Later on, when the collections are larger and more thoroughly worked up, a typical zoologic series should be arranged in connection with material from the Mesozoic and Cenozoic groups and recent invertebrates.

A list of the publications which appeared during the year and which were based on studies of the material contained in the collections or from field work done by myself, is given in the Bibliography, section IV of the Report.

DEPARTMENT OF INVERTEBRATE FOSSILS (PALEOZOIC). 185

The following table shows the number of accessions received during the year, and their extent:

Acc. No.	No. of Genera.	No. of species.	No. of specimens.	Acc. No.	No. of genera.	No. of species.	No. of specimens.
19,395*				19,967	1	1	2
19,588	3	3	8	19,983	1	1	2
19,627	2	2	2	19,990||			
19,710	1	1	1	20,352	2	2	2
19,714	5	5	11	20,392¶			
19,823	1	1	1	20,409	7	7	52
19,845†				20,629*			
19,858	2	2	2	20,653	7	10	14
19,859	2	2	5	20,692	4	5	22
19,889‡				20,746	1	1	1
19,896	1	1	4	Total	45	49	158
19,949	5	5	29				
19,951§							

* Of no paleontological value.

† To be transferred to Department of Lithology.

‡ Not examined.

§ Borrowed for comparison, and returned.

|| Transferred to Department of Mesozoic Invertebrate Fossils.

¶ Reports made and specimen returned.

REPORT ON THE DEPARTMENT OF INVERTEBRATE FOSSILS (MESOZOIC) IN THE U. S. NATIONAL MUSEUM, 1888.

By Dr. C. A. WHITE, *Honorary Curator.*

The accessions to the collections, other than the material transferred from the U. S. Geological Survey to the Museum, have been comparatively few, the most important being accession 20525, part of the valuable collection of the late Dr. Isaac Lea. This accession has not yet been arranged or entered on the catalogue. It contains several hundred excellent specimens representing, perhaps, three hundred species. The fossils are mostly European, and many genera and species characteristic of the European Mesozoic are embraced in this collection.

Most of the time of the honorary curator and his assistant, Mr. C. B. Boyle, has been devoted to the work of the U. S. Geological Survey, both being connected with that bureau. Much work has been done, however, in the way of identification of material sent in by different persons interested in paleontology, and many letters have been written in answer to inquiries addressed directly to the Honorary Curator.

A card catalogue of the collections has been made, giving the name, number, and location in the collections of all the identified specimens. The usefulness of this catalogue will depend largely upon a permanent arrangement of the collections.

No material has yet been put on exhibition, but a good representation of the Mesozoic formations of North America can be put out as soon as exhibition cases are provided.

The published works of the honorary curator have been based mostly on material collected by himself and assistants, but the collections of the Museum have been frequently and advantageously consulted. In the Bibliography (section IV) will be found a list of papers by the curator which have been published during the year. The following papers were also written, but have not yet been published:

Bulletin 51, U. S. Geological Survey, embracing five articles:

- (1) New Fossil Mollusca from the Chico-Tejon series of California.
- (2) On the occurrence of equivalents of the Chico-Tejon series in Oregon and Washington Territory.
- (3) Cretaceous Fossils from the Vancouver Island region.
- (4) The Molluscan Fauna of the Puget Group.
- (5) Mesozoic Mollusca from the southern coast of the Alaskan Peninsula.

Remarks on the Genus *Aucella*, with especial reference to its occurrence in California. (Monograph XIII, U. S. Geological Survey, pp. 226-232, pls. III and IV, by Dr. G. F. Becker.)

On the Geology and Physiography of a portion of northwestern Colorado and adjacent parts of Utah and Wyoming. (Ninth Annual Report U. S. Geological Survey.)

No attempt has been made to separate the collections into a reserve and exhibition series. The type specimens are kept apart from the other material and will form the larger part of the exhibition series. Quite a number of duplicates can be selected from the collections for exchange, but no exchanges of any consequence have yet been made.

The collection as a whole is in a very good condition. Most all the material belonging to the Museum has been identified, labeled, and properly entered on the catalogue. The space on the northeast balcony of the Smithsonian building, formerly used for storage, has been given up, and the material in the study series has been moved into the southeast court of the Museum.

Owing to the limited space in the southeast court a large part of the material has been stored in the old Armory building.

REPORT ON THE DEPARTMENT OF FOSSIL PLANTS IN THE U. S. NATIONAL MUSEUM, 1888.

By LESTER F. WARD, *Honorary Curator.*

My own time has been almost exclusively given to my official duties under the Geological Survey, principally in preparing the final monograph of the Flora of the Laramie Group, upon which I have been for some time engaged. Under my direction Prof. Leo Lesquereux, of Columbus, Ohio, has made considerable progress in the work of identifying the material collected by Capt. Charles E. Bendire in Oregon, which, as mentioned in my last report, was sent him for study. The material from the John Day River region has all been identified and returned to the Museum, and Professor Lesquereux's report has been edited by Prof. F. H. Knowlton and prepared for publication in the "Proceedings of the U. S. National Museum."* Several new species were detected among them.

Professor Knowlton has given some time to the continuation of his studies on the internal structure of fossil plants and has reached some interesting results. He has examined the large fossil trunks at the main entrance of the Museum building, and determined them to belong to the genus *Araucarioxylon*. The species was thought to be new to science and has been so described. The examination of the fossil wood collected in the Yellowstone National Park was first begun near the close of the year. This examination was hastily made, yet progressed far enough to enable him to say that the collection contains species belonging to the genera *Cupressinoxylon*, *Pityoxylon*, *Betulinium*, etc.

The papers which have been published during the year in reference to the work and material of this department are noticed in the Bibliography, section IV of the Report.

No very important accessions have been received during the year.

The routine work has largely consisted in caring for such miscellaneous material as came in and in labeling and arranging the specimens returned by Professor Lesquereux.

The exhibition series had also been begun early in February, 1888. Five cases similar to those used in the department of minerals were

* Professor Lesquereux's report on this material (accession 10769) will appear in volume XI.

placed at the disposal of the department, and the work of selecting and placing the material on exhibition was immediately commenced. The plan of the exhibition is to illustrate, as fully as the specimens at our disposal will allow, the evolution of the vegetable kingdom. It begins with the lowest forms, which are regarded as *Algae*, such as *Arthrophy-cus*, *Bythotrepis*, *Chondrites*, etc. The next class in the systematic scale is the *Fungi*, which are very rare in a fossil state, although a few species are known. The *Mosses* and *Hepaticæ*, which come next, are also very uncommon in a fossil state. Of the ferns hundreds of species are known and a very instructive series has been arranged, principally from the American Coal Measures. From the ferns the series passes through *Calamariæ*, which includes *Equisetum*, *Calamites*, and *Annularia*; the *Lycopodiaceæ*, including *Lycopodium*, *Lepidodendron*, *Sigil-laria*, and *Stigmara* to the *Gymnosperms*.

The *Gymnosperms*, beginning with the Cycads, pass through the *Cal-amodendrea*, *Cordaiteæ*, and *Dolerophylleæ* to the true *Conifers*, of which there are more than fifty fossil genera known. An ever increas-ing diversity of vegetable forms brings us to the *Monocotyledons* and eventually to the *Dicotyledons*, of which division thousands of species are known to science.

In connection with the actual specimens it is proposed to exhibit restorations selected from well-known authorities, such as *Cordaites*, by Grand'Eury; *Lepidodendron*, by Dawson, Lesquereux, and others.

In another series it is proposed to show the characteristic vegetation of each geological period, beginning with the lowest, and in immediate connection with these will be shown photographs from Unger, Heer, and others, showing at a glance the characteristic vegetation of each period.

PRESENT STATE OF THE COLLECTION.

Total number of specimens of catalogued material	8,243
Number of specimens not specifically identified (mostly wood)	1,757
Determined material.....	6,486
Duplicates stored in armory.....	1,091
Number of distinct species identified, catalogued, and installed	1,317
Of which there are—	
Paleozoic	420
Mesozoic	211
Cenozoic	686
The last catalogue number, June 30, 1887, was.....	249
The last catalogue number, June 30, 1888, was.....	268

REPORT ON THE DEPARTMENT OF RECENT PLANTS IN THE U. S. NATIONAL MUSEUM, 1888.

By LESTER F. WARD, *Honorary Curator.*

In the latter part of July I left Washington, accompanied by Professor Knowlton, for a two months' expedition to the Yellowstone National Park, Wyoming. The primary object of the expedition was to make a collection of fossil plants from this locality, but as opportunity offered collections of living plants were also made. The collection includes about three hundred species of flowering plants and about twenty-five species of mosses. A few were obtained in the vicinity of Bozeman, Montana, and on the road to the Park. The collections in the Park are mostly from the northeastern portion and about the principal geyser areas, and include several species new to the flora of the region. We returned to Washington about October 1.

Considerable time has been spent during the year in the determination of the specimens collected in the National Park, and also in selecting and verifying the identification of some of the material collected during the past two years in the District of Columbia. About one thousand species of these cultivated plants have been mounted and placed in the herbarium.

Among the many valuable accessions received during the year may be mentioned the following: Collection of seven hundred and sixty-eight species made in Mexico by Dr. Edward Palmer. This material is from a locality rarely visited by botanists, and contained many species that have been determined by Watson, Gray, Vasey, and others to be new to science. Equally valuable, although not as large, is the collection made by Mr. C. G. Pringle in another part of Mexico. It embraces two hundred and sixty-three species, a number of which are new.

Baron Ferd. v. Müller, of Melbourne, Australia, donated an interesting collection of nearly five hundred species of Australian plants. These were especially desirable, as there were before almost no specimens from Australia in the herbarium.

From the late Dr. Emil Bessels came a small but valuable collection of Arctic plants, obtained by him mostly from the island of Spitzbergen.

Mr. H. W. Henshaw donated a valuable set of the ferns, asters, and golden-rods of the District of Columbia.

Mr. Gerald McCarthy presented a series of between three and four thousand specimens of duplicate North Carolina plants.

A very valuable collection of the woods of North America for microscopical study was presented by Prof. S. P. Sharpless, of Boston, Massachusetts. There are about twelve hundred specimens representing over four hundred species, collected by special agents for the Tenth Census of the United States. The specimens presented were small pieces cut from the specimens used by Prof. C. S. Sargent in the preparation of his elaborate report on the Forests of North America for the Census Board.

Other donations of greater or less magnitude have been received from Messrs. Sturtevant, Echfeldt, Wood, Dugès, Hunter, Schuette, Reardon, Toner, etc.

A large part of the routine work has been devoted to caring for the collections. Mr. McCarthy has thoroughly poisoned all the material now on hand, including the duplicates and the specimens collected about the District. The six thousand specimens of duplicates that have accumulated during the past year have been incorporated with the main series of duplicates and the whole rearranged. The genera, or where large the species also, have been placed in covers and the whole labeled with strips of paper which project beyond the packages as they are placed in the cases. The whole duplicate series is arranged alphabetically for convenience of exchanging.

The leaf collection, which was commenced as early as 1888 for purposes of comparison with fossil plants, has been thoroughly rearranged and mounted on ordinary herbarium paper. They have also been arranged alphabetically. There are somewhat over one thousand species in this series.

During the month of February the long-contemplated exhibition series was begun. Five wall-cases were placed at the disposal of the Department, and two of them were immediately filled with miscellaneous botanical objects, such as fruits, seeds, plant products, etc. Most of the material at first placed on exhibition was selected from a lot sent to the National Museum from Kew some years ago. Subsequently considerable other material, such as species of *Polyporus*, woods of Canada, seeds and fruits of Australia, etc., was placed on exhibition.

The flowering plants collected in the Yellowstone National Park were worked up by Professor Knowlton, as was also the collection made by Messrs. Lucas and Palmer on the Labrador coast.

The mosses collected in the Yellowstone National Park were identified by Prof. Chas. R. Barnes, of the University of Wisconsin. Professor Barnes also identified the mosses collected by Lucas and Palmer. There were seven species, one of which, a beautiful *Bryum*, was new to science.

Dr. John W. Echfeldt, of Philadelphia, has identified several small lots of Lichens from various localities.

Dr. T. F. Allen, of New York City, has identified specimens of the *Characeæ* on several occasions.

Dr. George Vasey, botanist of the U. S. Department of Agriculture, has identified several small sets of grasses from various places.

Prof. L. H. Bailey, jr., now of Cornell University and the well-known authority on the genus *Carex*, kindly looked over the extensive mounted material in the herbarium, and corrected several errors of determination or synonymy, and Mr. Th. Holm, soon after his arrival in April, did the same for the duplicate *Carices*.

The papers published during the year by the curator and assistant curator are noted in the Bibliography, Section IV.

PRESENT STATE OF THE COLLECTION.

Number of species in herbarium, June 30, 1887	17,247
Number of species added during the year	1,161
Number of species in herbarium, June 30, 1888	*18,408
Number of duplicate species, June 30, 1888, estimated	4,500
Number of duplicate specimens, June 30, 1888, estimated	10,000
Last catalogue entry in June, 1887	93
Last catalogue entry in June, 1888	138

*The total number of specimens in this Department is estimated at 38,000.

H. Mis. 142, pt. 2—13

REPORT ON THE DEPARTMENT OF MINERALS IN THE U. S. NATIONAL MUSEUM, 1888.

By F. W. CLARKE, *Honorary Curator.*

During the year the routine work of the Department has been mainly carried on by Mr. W. S. Yeates, under my direction, and the collection of minerals has grown quite rapidly. The following important accessions are noteworthy :

The collection of meteorites has been considerably enlarged by gift and by exchange. Twenty-three falls were added to the list, and four casts of well-known and characteristic meteors. On the first of July our meteorite collection numbered one hundred and twenty-four distinct falls ; and the Shepard collection, which itself has been notably increased, will bring the total number represented in the Museum up to fully two hundred and fifty. Exchanges were made with the British Museum, the Educational Museum of Tokio, the National Museum of Brazil, Amherst College, Mr. J. R. Gregory of London, his excellency J. de Siemachko of St. Petersburg, Ward & Howell of Rochester, and Mr. G. F. Kunz of New York. The Government of the Netherlands East Indies, presented a fine piece of the Djati Pengilon, Java, meteorite ; Mr. Richard Pearce gave a specimen of the Albuquerque iron ; fragments of the Fayette County, Texas, and Rockwood, Tennessee, falls were given by Ward & Howell, and Mr. Kunz contributed examples of the Taney County, Missouri, stone, and the iron from Chattooga County, Georgia.

The gem collection has grown but little since the last annual report. At the Cincinnati Exposition a small selection from it is now exhibited, and some valuable additions have been made to the collection for that display, mostly by purchase. They include a small series of polished specimens of the Arizona agatized wood, a fine medallion carved in labradorite, a group of fruit carved in different precious stones from Siberia, eighteen beryls from North Carolina, thirteen opals from Mexico, five moonstones from Virginia, an oval dish of crocidolite quartz, a South African diamond in the gangue, a large blue-white topaz from Japan, and perhaps twenty minor stones. Five cut beryls of different colors, all from Litchfield County, Connecticut, were presented by the New England Mining Company, through Mr. J. F. Barse.

The general collection of minerals has received some very important additions. First in magnitude is the collection bequeathed to the Mu-

seum by the late Isaac Lea. In this collection, which is not yet catalogued, is a unique series of micas, which, by the terms of the will, must remain intact by themselves. Among the miscellaneous minerals are valuable suites of brucite, ripidolite, clinochlore, fluorite, corundum, calcite, witherite, bromlite, barytocalcite, the Pennsylvania feldspars, and the Phoenixville lead ores.

Through the U. S. Geological Survey the Museum has received the minerals collected at the Denver office of that organization. They include the type specimens of Cross and Eakin's ptilolite, the types of Cross and Hillebrand's researches upon the Table Mountain zeolites and the Pike's Peak fluorides, and the rare copper arsenates from Utah described by Hillebrand. The survey has also contributed some fine minerals collected in St. Lawrence County, New York, by Prof. S. L. Penfield, a series of wood opal collected in Montana by Dr. A. C. Peale, and a number of miscellaneous specimens from various sources. Among the latter may be named a suite of the nickel silicates from Douglas County, Oregon, sent to the Survey by Mr. W. Q. Brown, and some vanadinites from Arizona, presented by Dr. O. Lincoln.

During the summer and early autumn of 1887 two collecting trips were made by Mr. Yeates. In his first trip he visited the iron mines of Lake Champlain, the localities of Orange County, New York, the serpentine deposit at Montville, and the zinc mines of Franklin, Stirling, and Ogdensburgh, New Jersey. Excellent suites of minerals were obtained at all of these points, partly by direct collection, partly by gift from local mineralogists. The second trip was to North Carolina, and yielded a good series of quartz and corundums from Iredell and Alexander Counties, some fine garnets, beryls, and kyanites, and a large quantity of bronzite, genthite, chromite, and samarskite.

By purchase and exchange the additions to the collection have been more in quality than in quantity. Some excellent English minerals were purchased of Messrs. F. H. Butler and S. Henson, in London, having been selected by myself during my visit to Great Britain. Satisfactory exchanges were made with the California State Mining Bureau, and Mr. C. W. Kessler, of Statesville, North Carolina.

Gifts have been received from many sources. Our especial acknowledgments are due to Messrs. R. E. C. Stearns, W. J. Mullins, G. F. Kunz, C. W. Cunningham, W. B. Smith, H. G. Hanks, J. D. English, W. P. Rowe, T. K. Bruner, Grinnell Burt, Henry Mapes, Wm. Cooper, Col. P. J. Sinclair, Thomas Lewis, D. A. Bowman, C. E. Beecher, E. M. Reynolds, S. C. Young, C. S. Bement, J. A. D. Stephenson, P. O. Dwyer, Otto F. Pfordte, and the Green River Zircon Mining Company.

The routine work of the department needs no special notice here, having followed the lines established in previous years with no changes of importance. The only researches prosecuted upon Museum material are referred to in the Bibliography,* the work in each case having been

*See section IV of the Report.

done upon specimens belonging to the Geological Survey previous to its transfer to our collections.

On account of the large accessions received from the executors of Dr. Isaac Lea and from the Denver office of the Geological Survey, the number of specimens now in the collection can not be at present properly estimated. Of material actually catalogued the following figures are precise:

Specimens entered.....	3,295
Separate entries.....	347
Assigned to reserve series.....	557
Assigned to duplicate series.....	2,719
Rejected	19

Of the 3,295 specimens entered, 3,253 represented new accessions, the remaining 42 having been uncatalogued in the old collection.

One hundred and fifty-five specimens were distributed as gifts and 474 in exchange. Total disbursements, 629 specimens.

Last entry in catalogue, June, 1887.....	47,490
Last entry in catalogue, June, 1888.....	47,837

REPORT ON THE DEPARTMENT OF LITHOLOGY AND PHYSICAL GEOLOGY IN THE U. S. NATIONAL MUSEUM, 1888.

By GEORGE P. MERRILL, *Curator.*

The work of the year, as heretofore, has been almost wholly in the line of the preparation of the exhibition, study, and duplicate series. During July and the early part of August my time was occupied in completing and putting into shape for the printer a hand-book of the building-stone collection. This work comprised not only a catalogue of the collection giving the name, color, geological age, locality, size, shape, and name of donor of each individual specimen, but also gave as full an account as the size of the volume would permit of the leading quarries in the United States, the character and quality of their output and their capabilities; it included also chapters on the structure and composition of rocks, their weathering qualities, methods of quarrying and dressing, results of pressure tests, and on the selection of stone for any form of building and ornamental work; the idea being to put in convenient form such facts relative to these stones as should enable any one of ordinary intelligence and education to gain an idea of the various kinds of rocks, their uses and adaptability for structural purposes. The work was finally completed and the manuscript sent the Government Printer early in September. In the final preparation of this work I was assisted by Mr. Hudson, draughtsman. From August 10 to September 10, I was absent on my annual vacation. September 26 was begun the work of re-arranging the exhibition hall. This occupied our entire attention until the latter part of November, and can not even now be claimed to be completed. The arrangement decided upon involved the moving of nearly every case in the hall as well as nearly every specimen, regardless of size, weight, or shape.

Early in April the material in the temporary storage sheds was thoroughly overhauled, all superfluous specimens rejected, and the remainder taken into the Museum or removed to another temporary storage shed at the Armory building. The location of this shed at such a distance is a matter of great inconvenience. Indeed the prevailing condition of affairs affords a very striking illustration of the inadequacy of the present accommodations for a geological museum.

Owing to the numerous calls from educational institutions for duplicate materials work was begun early in the spring with a view to preparing fifty sets, of some fifty specimens each, showing the more common forms of rock types. These sets are as yet far from complete; in every case some of the most important rock groups being wholly unrepresented. This is due to the fact that the materials necessary for these are to be found only in the West, whence the Museum has at present no means of obtaining them. The curator has on sundry occasions endeavored to bring about some arrangement whereby field parties in the employ of the U. S. Geological Survey should procure for us the desired materials. Up to date such attempts have been only partially successful.

The more important accessions of the year are included in the following list:

(1) An interesting series of Devonian marbles and miscellaneous eruptive rocks, received in exchange for other material from Mr. R. N. Worth, curator of petrology in the Plymouth Institute, Plymouth, England.

(2) A fine block of contorted schist from Brandon, Vermont, collected for this department by Mr. F. H. Knowlton, of the Department of Fossil Plants.

(3) A large series of eruptive rocks, minerals, vein and joint formations, etc., from New Jersey, Rhode Island, Massachusetts, and Maine, collected by the curator during his summer vacation. Especially valuable in this series are the Metasomatic serpentines from Montville, New Jersey; the Kersantite from Franklin Furnace in the same State; the contorted gneiss and vein formations from Maine. I call particular attention to this collection, since a large proportion of it is of such a nature as to be unobtainable but by sending a collector into the field for the express purpose. Later this material was supplemented by a small collection of serpentine, miscellaneous eruptive rocks and fragments of a new meteorite obtained by the curator while in San Francisco in March. A portion of the material mentioned above furnished data for special papers.*

(4) An interesting series of Pyrite concretions from New Foundland, and some twenty specimens phonolite from the Black Hills, Dakota, received in exchange from Prof. W. O. Crosby.

(5) Two slabs of polished Algerian and English marbles. Gift of E. Fritsch 515 and 517 west Twentieth street, New York.

(6) Some 500 pounds Glaucophane rock from near mouth of Sulphur Creek, Sonoma County, California, collected for the Museum by W. L. Jones.

(7) A selected series of geological material comprising metamorphosed chalk, cone in cone, contorted gneiss and contorted fossil, volcanic bomb from the Auvergne, and three specimens showing vein structures received from A. A. Duly in exchange for other material.

(8) Some 300 pounds Peridotite from near Webster, North Carolina, collected for the Museum by Mr. W. H. H. Schreiber.

(9) Several fragments of Fulgurite tubes from Cedarville, New York; gift of H. S. Garrison (through R. Burns, of the U. S. Geological Survey).

(10) Some 600 pounds volcanic rocks from the vicinity of Bozeman, Montana; collected for the Museum by James Forristell.

(11) A relief map of Oahu, received from Prof. C. H. Hitchcock, of Hanover, New Hampshire, in exchange.

* See Bibliography, section IV of the report.

(12) Two fine samples of Fulgurite on eruptive rock; gift of Mr. J. S. Diller, U. S. Geological Survey.

(13) A large collection of eruptives, metamorphic, and sedimentary rocks from Colorado; received from S. F. Emmons, U. S. Geological Survey. This includes a type collection of the rocks and ores of Leadville, as described by Messrs. Emmons and Cross in Monograph XII, U. S. Geological Survey. This is by far the most valuable accession of its kind of the year.

(14) A fine series of fossil coral for cutting and polishing; received by way of exchange from C. C. Nutting, Iowa College, Iowa.

(15) A series comprising one hundred photographs. Scenery of United States, New Zealand, and Australia. This is old material received from the Centennial Exposition in 1876, but not before assorted and catalogued.

(16) A fine large block (22 by 21 by 15 inches) of Ophite marble from Thurman, Warren county, New York. Gift of R. L. Baxter. This specimen is of interest not merely on account of its unique appearance, but also on account of the light which it throws on the origin of this class of rocks.

(17) A complete series of specimens collected at intervals of every 50 feet from the tunnel of the new aqueduct extension in this city. For this collection we are indebted to Mr. Thomas Robinson, formerly of Howard University. That the collection was in process of preparation has been noted in my previous report.

ROUTINE WORK.

The general character of the routine work of the year may be best inferred by a perusal of the following outline showing the scope of the department.*

Considering geology not merely as a science treating of the composition and structure of the earth, but as one which comprises its origin and history also, one whose aim it is to "trace the progress of our planet from the beginning of its separate existence through its various stages of growth down to the present condition of things," we begin with a consideration of—

I. *The earth in its cosmical aspect.*—In this first primary division the earth is represented as a planet and compared with other members of the solar system. This can of course be done only by means of models and illustrations of various kinds.

II. *The structure of the earth—Geology.*—This second primary division which comprises the science of geology as ordinarily understood, is subdivided into five sections, each of which is capable of further subdivision. Considered in the order adopted, these are:—

A. *Geognosy; a consideration of the materials of the earth's substance.*—Under this section are to be shown (1) the sixteen more common elements which in their various combinations are estimated to form about 99 per cent. of the substance of the earth's crust; (2) the minerals which, resulting from these combinations, go to make up rock masses; and (3) the rocks themselves. All the substances required for these exhibits are of such nature as to admit of their being readily utilized. Not even the fact that an element is a gas both colorless and tasteless

* Extracts from a paper on Geological Museums read by the Curator before the Philosophical Society of Washington.

need be considered an obstacle, since a glass jar of hydrogen, though apparently empty, is, if properly labeled, as instructive as though the substance itself were tangible. Samples of the various forms of labels employed, in this as well as the other collections, will be given later. In the collection of rock-forming minerals the specimens are selected not for their beauty or fine crystallographic development, but ordinary forms, both crystalline and massive, are shown in all their principal varieties. The collection is divided into (1) primary minerals, or those which formed at the time of the consolidation of the rock, and (2) secondary minerals, or those which have formed since its consolidation, and are due mainly to decomposition, hydration, or solution and recrystallization. The individual labels further state whether the mineral is an essential or accessory constituent and of what class of rocks it forms a part. In the rock collection the samples are as a rule trimmed with a hammer into sizes approximately $3\frac{1}{2}$ by $4\frac{1}{2}$ by 1 inch, this size having been found most convenient when everything is taken into consideration. The rule is not, however, inviolable, and both size and shape are allowed to vary when the character of the rock renders this advisable. Care is taken in all cases to procure fresh and characteristic material and that no specimen shall show abrasive marks from the hammer or other agencies on its exposed surface. This collection it has been found advisable to precede by a structural series, *i. e.*, a small series showing all the common forms of rock structure. It is the object of the collection to explain the meaning of sundry terms in common use among geologists, but whose exact meaning is not always understood by the public at large. Such a collection really forms an illustrated glossary, since the meaning of each term, as porphyritic, cellular, etc., is shown by means of a specimen in which this structure is the most pronounced characteristic. This collection is supplemented by a series of twelve enlarged photo-micrographs, showing the structure of rocks as revealed by the microscope and seen in polarized light. The general rock collection I should say is classified by kinds, regardless of locality or economic value. The rocks of strictly economic value, exclusive of ores, are now grouped by themselves in the extensive collections of (*a*) building and ornamental stone and (*b*) stones used for abrading purposes. The first-named of these, as I have stated in previous reports, it has been found advisable to have cut in the form of 4-inch cubes, polished on the front face when the nature of the stone permitted. The remaining faces being finished as follows: Drafted and pointed on the left side; drafted rock face on the right side, rock face behind, and smooth sanded or chiseled on the top and bottom. In special cases, as with coarse figured or remarkably unique marbles, it has been found advisable to deviate from this rule and finish the stone in the form of a thin slab from 4 to 12 or even 24 inches in greatest dimensions. Finished objects of stone, excepting so far as they demonstrate the adaptability of a rock to some particular purpose, are as a rule excluded as belong-

ing more properly to the Department of Arts and Industries. The stones used for abrading purposes, *i. e.*, hones, whetstones, grindstones, etc., are shown in the forms in which they are used in the various industries. The grindstones proving too bulky for our limited space are proportionately reduced in size.

B. *Dynamical and Physiographical Geology.*—Under this section are discussed the agencies and methods of geological change. It is of course impossible to represent these agencies in actual operation, and we must confine ourselves to a display of results which the labels must explain. In this section are placed those objects illustrative of (1) Plutonic or hypogene action, under which are included (*a*) heat as displayed in metamorphism, production of veins, volcanoes, volcanic action and non-volcanic igneous ejections; (*b*) the movement of the earth's crust as displayed by folds and faults; (*c*) cohesive attraction as displayed by crystallization, cleavage and concretionary structure, and (*d*) the chemical processes of rock formation and metamorphism, this last division comprising chemical Geology. We then pass to (2) Surface or epigene action, where are displayed materials illustrative of the destructive, constructive and reproductive effects of the atmosphere, of surface water, and of life in its various forms. The effects of atmosphere and water are illustrated by specimens showing the destructive chemical process of oxidation, deoxidation, hydration and solution, or the general phenomena of rock weathering as displayed in the breaking down of rocks and the formation of soils, and in the erosive power of water, shown in part by models; while the constructive and reproductive effects are shown by the formation of sand dunes, deltas, stalagmitic deposits and sinters. The effects of life in all its various forms is shown by the wood and stone burrowing of insects and animals, by the protective action of algæ, moss, lichens, by deposits of diatomaceous earth, the formation of coral islands* and of coal, guano beds, etc.

C. *Structural Geology: The architecture of the Earth's Crust.*—Under this third head are displayed (1) Stratified rocks showing stratification and its accompaniments, as false or current bedding, ripple marks, mud cracks and foot prints; (2) Igneous rocks, both contemporaneous and intrusive; (3) Metamorphic rocks; (4) Mineral veins; (5) Surface deposits and (6) Joints, cleavage, curvature and dislocations, and other modifications of the primary arrangement of the earth's crust. Many objects are here displayed of precisely the same nature as under dynamical geology, in the one case illustrating the methods by which certain structures are brought about, and in the other the structures themselves.

D. *Stratigraphical or Historical Geology.*—Under this, the fourth subdivision, is considered the chronological succession of the geological formations, the rocks being arranged according to the order of their deposition or ejection. From this series fossil forms are to a large extent

*See also Bermuda Collection to be noted later.

excluded, as belonging more properly to the department of palæontology. As at present contemplated, the main idea in view is to show that the same geological forces have been in operation, and that rocks of the same general nature have been in process of formation from the earliest times down to the most recent. This collection, although now comprising some four hundred specimens, is far from complete, and can not be satisfactorily arranged for lack of proper cases.

The following show the character of labels used in the various collections. All are exact copies of labels now in use.

[FORM OF LABEL USED IN COLLECTION OF ROCK-FORMING MINERALS.]

ORTHOCLASE. POTASH FELDSPAR.

Composition: $K_2Al_2Si_6O_{16}$ = silica 64.7 per cent.; alumina 18.4 per cent.; potash 16.9 per cent.

Crystalline System: Monoclinic.

An essential constituent of granite, gneiss, syenite, and orthoclase-porphry; occasionally found in more basic eruptive rocks, such as diabase. Under the name sanidin is included the clear, glassy variety of orthoclase occurring in Tertiary and modern lavas, as trachyte, phonolite, and liparite. Orthoclase often occurs in large deposits, and is quarried and used in the manufacture of pottery.

[Form of label used in structural series of rocks.]

Vitreous Rocks.

VESICULAR STRUCTURE.

Obsidian Pumice.

MONO LAKE, California.

29,630.

Collected by G. K. GILBERT, 1883.

[Form of label used in general rock collection.]

AUGITE SYENITE.

TIN MINES, Jackson, New Hampshire.

29,587.

Gift of Dr. G. W. HAWES.

[Form of label used in building-stone collection.]

SANDSTONE.—A coarse, dark-yellow, sub-Carboniferous sandstone, from the quarries of Isaac Crickfield.

HOWARD STATION, KNOX County, Ohio.

25,416.

Collected by the TENTH CENSUS, 1880.

[Form of picture label.]

ROCKING BOWLDER.

EAST LYME, NEW LONDON CO., CONNECTICUT.

36,772.

Gift of Mr. JAMES SHEPARD, 1885.

The granite boulder of which the above is a photograph is situated in the southwest part of East Lyme, New London Co., Connecticut. It is said to weigh from 30 to 40 tons. Though resting upon a comparatively small face, the strength of an ordinary man is insufficient to set it in motion.

On receipt of new material, then, the first matter to be decided upon is to which one of the various collections it is best adapted, after which it is cut and trimmed to such size and shape as is best suited for convenience in handling, and best brings out the characteristics which it is intended to illustrate. In all cases an entry is made in the Museum catalogue giving all available details regarding the material, and the corresponding number painted in oil colors upon the specimen itself. Specimens designed for exhibition have temporary written labels prepared, duplicates of which are sent to the Government Printer when a sufficient number have accumulated. The copy for some two hundred and fifty labels has thus been sent during the past year.

Thirteen sets of duplicates, mostly in the way of exchange, have been sent out during the period covered by this report. They are as follows:

July 14, 1887, to Mr. R. N. Worth, Plymouth, England, set twenty-eight specimens miscellaneous American rocks.

August 9, 1887, to Dr. William Hallock, U. S. Geological Survey, for experimental work, two samples of building stones.

September 17, 1887, to Mr. P. C. Manning, Portland, Maine, set of Bermuda rocks, comprising nine specimens.

December 2, 1887, to Mr. R. N. Worth, Plymouth, England, set of miscellaneous rocks and marbles, comprising fourteen specimens.

December 12, 1887, to Mr. T. F. Lamb, Portland, Maine, one polished slab pegmatite from Auburn, Maine.

January 12, 1888, to Dr. George H. Williams, Johns Hopkins University, Baltimore, Maryland, set of miscellaneous American rocks, fourteen specimens.

January 13, 1888, to Prof. W. O. Crosby, Massachusetts Institute of Technology, Boston, Massachusetts, set of miscellaneous American rocks, eleven specimens.

March 5, 1888, to Prof. C. H. Hitchcock, Dartmouth College, Hanover, New Hampshire, set miscellaneous American rocks and geological specimens, seventy-four specimens.

March 19, 1888, to Oberlin University, Oberlin, Ohio, set of miscellaneous rocks, minerals, and building stones, one hundred and twenty-five specimens.

April 18, 1888, to Mr. R. N. Worth, Plymouth, England, set of miscellaneous rocks, twenty-four specimens.

April 26, 1888, to Mr. Whitman Cross, U. S. Geological Survey (loaned for study), collection of rocks from the Elk Mountains and vicinity, Colorado.

June 8, 1888, to Mr. J. S. Diller, U. S. Geological Survey (loaned to complete series of American rocks designed for exhibition at Cincinnati), twelve specimens.

June 18, 1888, to Mr. W. H. Hobbs, Worcester, Massachusetts, set of miscellaneous American rocks, twenty-two specimens.

Special reports on material received for examination and report from parties as a rule not in any way connected with the Museum have been prepared, as follows:

- (1) On accession 19326, received from Mr. R. W. Page, Salem, Roanoke County, Virginia.
- (2) On accession 19387, received from Dr. C. F. Lick, Shady Grove, Tennessee.
- (3) On accession 19434, received from Dr. J. W. Folson, Atoka, Indian Territory.
- (4) On accession 19483, received from C. Werdermann, Calera, Alabama.
- (5) On accession 19500, received from F. M. Mercia, Garrett, Indiana.
- (6) On accession 19544, received from Mr. Harry L. DeZeng, Geneva, New York.
- (7) On accession 19564, received from Mr. I. S. Jeffers, Huffman, Indiana.
- (8) On accession 19603, received from Hon. C. N. Richards, U. S. Senate.
- (9) On accession 19705, a so-called "mad-stone," received from Mr. Donald McRae, Wilmington, North Carolina. The stone was merely an indurated clay, and owed its adhesive and consequent imaginary curative property to its power of absorbing moisture with great rapidity.
- (10) On accession 19760, received from W. F. Cooper, Bristol, Tennessee.
- (11) On accession 19677, received from C. D. Hay, Hot Springs, Arkansas. This was a ferruginous sandstone, the natural weathering of which had given rise to peculiar markings on its surface, and which were supposed to be of human origin.
- (12) On accession 19788, received from R. H. Howell, Nashville, Tennessee.
- (13) On accession 19829, received from J. E. Baker, Stoutsville, Ohio.
- (14) On accession 19975, received from E. H. Spooner, Virginia City, Nevada.
- (15) On accession 19990, six samples of building stone, received from G. H. Ragsdale, St. Jo, Montague County, Texas.
- (16) On accession 20024, a polishing powder, received from W. J. Bames, Oshkosh, Wisconsin.
- (17) On accession 20124, received from J. H. Wilson, Gillenwater, Tennessee.
- (18) On samples of limestone received from A. H. Stine, Leavenworth, Indiana.
- (19) On volcanic lapilli submitted by Mr. Thomas Wilson, of the National Museum.
- (20) On accession 20023, fossil foot-prints in Triassic sandstone, received from Mr. A. Wanner, York, Pennsylvania.
- (21) On accession 20346, received from C. B. Richardson, Chester, Virginia.
- (22) On accession 20380, received from A. J. Wilcox, city.
- (23) On accession 20392, supposed fossil, referred to palæontologist.
- (24) On accession 20394, received from W. H. Jack, Natchitoches, Louisiana.
- (25) On accession 20406, received from F. G. King, Clifton Springs, New York.
- (26) On accession 20424, siliceous concretion, received from Lieutenant Blow, Fort Randall, Dakota.
- (27) On accession 19328, received from J. P. Snyder, Murphy, California.

- (28) On accession 20520, received from F. G. King, Clifton Springs, New York.
- (29) On accession 20542, received from Mr. Josiah Rinker, Gainesborough, Virginia.
- (30) On accession 20536, received from Mr. J. W. Worth, Stockton, Virginia.
- (31) On accession 20599, received from Mr. George W. Watkins, Moriah, New York.
- (32) On accession 20675, received from L. Corrine, New Hurley, Ulster County, New York.

Particular attention has been paid during the year to the stratigraphic, structural, and dynamical geology exhibition series, and many important additions have been made; among them I may mention the proportional column of the stratified rock formations of New Hampshire; the fine examples of veins, contortions, crushing and faulting, as well as the series showing contact metamorphism, and the very beautiful and instructive series of rocks from Montville, New Jersey, showing the derivation of serpentine from pyroxene by the process of metasomatism. Those portions of the collection showing the constructive and destructive effects of plant and animal life have also made some progress. The latter collection is supplemented by a collection illustrative of the formation of a coral island, Bermuda being taken as an example. This begins with the more common types of corals and shells from the neighboring waters, followed by the loose fragmental material derived from them, and which, when mixed with more or less carbonaceous and ferruginous matter, forms the characteristic soil of the island. These in turn are followed by the common limestone, made up from these compacted fragments, and these again by the stalagmitic and stalactitic coarsely crystalline secondary rocks formed by the solution and recrystallization of the fragmental materials. The series closes with a small collection of rocks foreign to the island, and which have been drifted thence, presumably entangled in the roots of trees, and cast upon the beaches.

In the prosecution of the work as above outlined I have received assistance as follows:

From July 1 to July 8, Mr. E. Kirby Smith; from July 15 to 18, Miss Carrie Rosenbusch; from July 13 to September 7, Mr. Hudson (draughtsman); from September 26 to January 15, 1888, Mr. F. L. Fuller; from January 19 to February 8, Mr. L. H. Merrill; from March 12 to the close of the fiscal year, Mr. William B. Merriman. Mr. Forney, stone-cutter, has continued with the department for the greater part of the year. The short term of service of all but one of the above rendered their assistance of much less value than it might otherwise have been. Indeed, in the majority of cases, the proper order was reversed, and the curator served as assistant while endeavoring to instruct the intended assistant in the duties of his office. This condition of affairs, while undoubtedly unavoidable for the present, must necessarily react more or less disastrously upon the department.

Aside from the study necessarily given to materials incident to their proper identification and installation, special attention has been given to the peridotite from Little Deer Isle on the coast of Maine; a new

meteorite from San Emigdio County, California, and the Montville serpentine above noted. Papers on these have been prepared for the Museum Proceedings, but at date of writing have not been issued. Preliminary notices of them have, however, appeared in other publications, as will be noticed by reference to the Bibliography—Section IV of the Report.

The present condition of the collection is shown by the following table. It must be understood, however, that the figures given for the duplicate series are merely approximations, since the material is, as a rule, brought in in bulk, and broken up into sizes to suit special conditions, and as occasion demands.

Number of specimens in reserve series.....	20,000
Number of specimens in duplicate series.....	2,500
Total	22,500
<hr/>	
The reserve series is distributed as follows:	
On exhibition.....	6,944
In drawers for study and comparison.....	13,056
The exhibition series comprises:	
General lithological series	2,383
Economic series:	
Building and ornamental stones, and stones used for sharpening edged tools..	2,946
General geology.....	1,615
	<hr/>
	26,944

The entries upon the department catalogue during the year comprise the following numbers: 38954 to 39400 inclusive, and 68801 to 69556 inclusive.

REPORT ON THE DEPARTMENT OF METALLURGY AND ECONOMIC GEOLOGY IN THE U. S. NATIONAL MUSEUM, 1888.

By F. P. DEWEY, *Curator*.

Early in the year it was decided to make some changes in the exhibition space of the department. Instead of dividing the exhibits between a range, a part of a hall, and a part of the southwest court, the whole of the southwest court was assigned to the department.

The entire energy of the department for the whole year has been devoted to work incident to this change.

The opportunity was taken to completely reorganize the geographical series of ores, and to make some changes in the systematic collections in economic geology and metallurgy. The latter collections are now in shape again for exhibition, and as soon as a portion of the geographical series is arranged, about one-half of the exhibition space can be thrown open to the public. It is hoped to do this by the first of January, 1889.

Among the especially noteworthy collections received during the year should be mentioned:

A series of wood alcohol products, obtained in the manufacture of charcoal on a large scale, as a blast-furnace fuel; from the Works of the Standard Charcoal Company, at Goodrich, Tennessee. Collected by E. F. Coffin.

A very interesting series of aluminum bronzes and other rare alloys, made by Biermann, of Hanover. Presented by the "Iron Age" of New York City.

A large series of the nickel ores of Webster, North Carolina, together with the chromium ore. Presented by W. A. H. Schriber, Webster, North Carolina.

A small but very instructive series illustrating the process of utilizing the low grade sulphide ores of Leadville, Colorado, as practised by the concentrating mill of the Colonel Sellers mine. Presented by Taylor & Brunton, Leadville, Colorado.

A series of the gold, nickel, and chromium ores of California. Presented by L. W. Green, Baird, Shasta County, California.

There have been two important collections turned over to the department by the U. S. Geological Survey. One, embracing five hundred and thirty-nine specimens, was collected by Mr. J. S. Curtis in preparing his report on the silver-lead district of Eureka, Nevada. The second is a very extensive collection, embracing seven hundred and thirty-three specimens, collected by Mr. S. F. Emmons in preparing his report upon the geology of Leadville, Colorado.

Two researches were carried on during the year. The first was the perfecting of the Hampe method of determining sub-oxide of copper in metallic copper, in order to carry on a further investigation upon the refining of pig-copper; and the other was a complete chemical examination of the very large collection of the Lone Elm Smelting Works at Joplin, Missouri. The latter investigation necessitated the making of sixteen complete chemical analyses, including the working out of several special methods of analysis to apply to some of the products. At these works the non-argentiferous galena of southwest Missouri is smelted to pig-lead, and the fumes given off during the smelting, which are ordinarily lost, are transformed into white paint. These fumes are exceedingly interesting and complex in their composition, and their analysis has afforded much new and valuable information.

The total number of specimens in the department is now about 51,000; of these, 18,000 are in the exhibition series, 12,000 are duplicates, and 9,500 are in the reserve series. The remainder consists of specimens, as yet unclassified, which for the present are considered as reserve material.

One hundred and one accessions have been received during the year, of which 72, containing 128 specimens, were transmitted for examination and report. Twelve special reports were made in answer to technical questions submitted by correspondents.

In cataloguing the collection 1,413 entries have been made, covering 2,412 specimens; and 1,444 catalogue cards have been written.

Last entry* in June, 1887.....51314, 59424, 65384, 68584.

Last entry* in June, 1888.....51539, 59464, 66431, 68685.

As a preliminary to the re-arrangement of the geographical collection of ores, the entries of material assigned to this department which were scattered through several record volumes, in which both rock and mineral specimens were also entered, have been transferred to the record books assigned to this department; 7,046 entries have thus been transferred.

Twenty-nine boxes of duplicate and reserve material have been placed in general storage, and six specimens were sent out in exchange.

The clerical work of the department has been well performed by Mr. W. H. Newhall, assisted during a portion of the year by Mr. T. R. Turnbull.

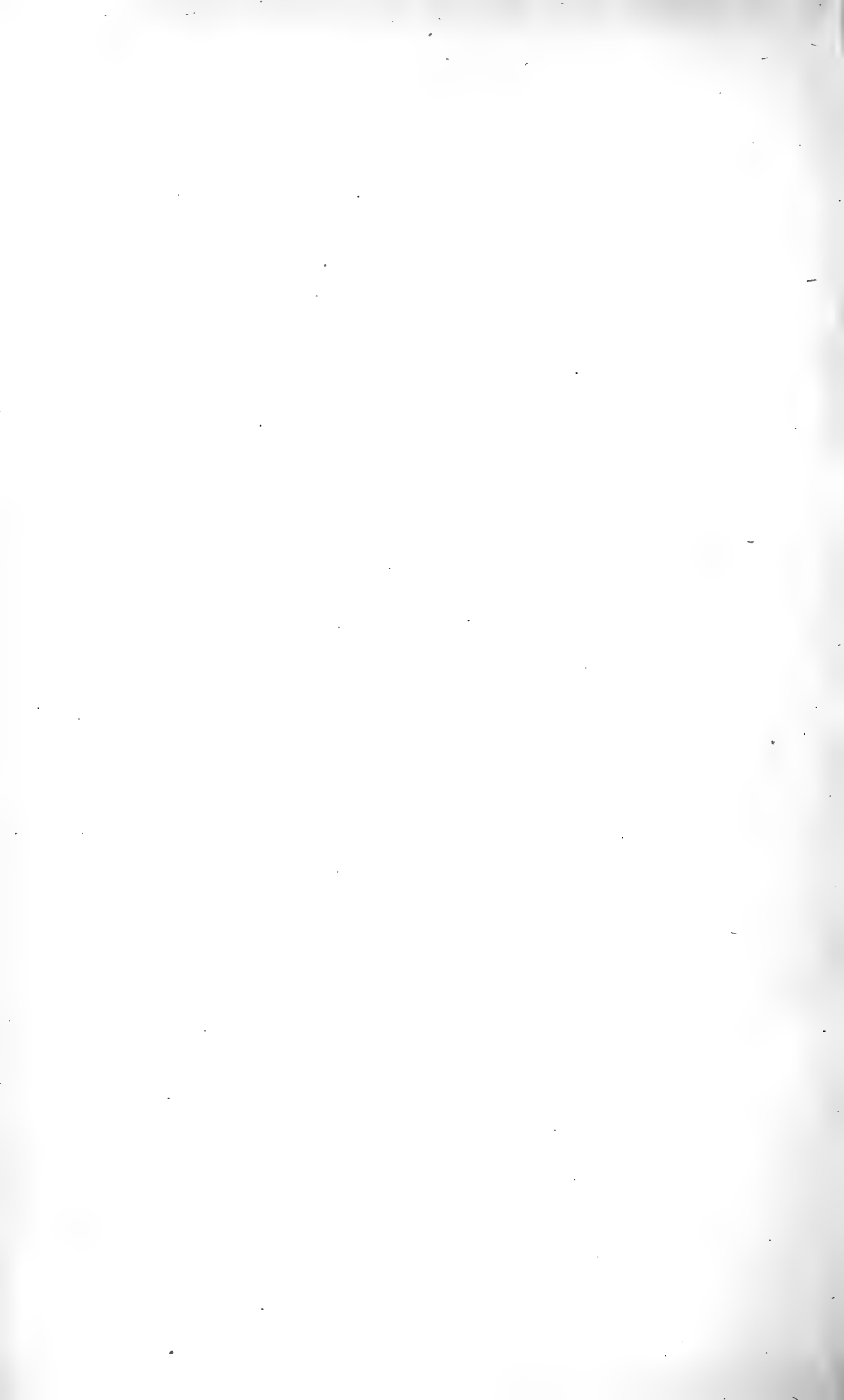
* The catalogue records are kept in four series of books.

During the year the curator has published a paper entitled "Photographing the Interior of a Coal Mine," in the Transactions of the American Institute of Mining Engineers, vol. 16, page 307. In this is given an account of taking some photographs of the interior of the Kohinoor Colliery by electric light during the summer of 1884. The paper is illustrated by plates of four of the views obtained, copied by the Levytype process, direct from the negative, without any retouching.

Mr. J. F. Kemp has published two articles descriptive of the southeast Missouri lead regions, based upon the notes and collections made by him when collecting material for this department for the New Orleans Exposition in 1884.

The first paper is entitled "Notes on the Ore Deposits and Ore Dressing in Southeast Missouri," published in the School of Mines Quarterly, vol. 9, page 74, and embodies his observations upon the ore deposits, the methods of mining, and the mechanical dressing of the ore. The last subject is treated very fully.

The second paper is entitled "Notes on Lead Smelting in Southeast Missouri," published in the School of Mines Quarterly, vol. 9, page 212, and gives a description of the various smelting processes followed, together with many valuable analyses.



REPORT ON THE DEPARTMENT OF LIVING ANIMALS IN THE U. S. NATIONAL MUSEUM, 1888.

By W. T. HORNADAY, *Curator*.

From the date of the plan of organization of the National Museum it has been the intention of its founders that it should eventually include a Department of Vivaria, to afford materials for the prosecution of scientific studies, as well as for general educational purposes. The organization of the present Department of Living Animals was hastened, and finally precipitated, by the imperative needs of the taxidermic force for living models to be studied daily in connection with work on the series of family groups of American mammals begun last year for the display of mounted mammals. The experiment of keeping live animals for this purpose in the taxidermic laboratory had proven expensive and in many ways unsatisfactory. Inasmuch as it had been determined to spare no effort in this work, and to produce a series of groups which should be as nearly perfect as possible, it was deemed necessary to form a small collection of living animals for purposes of study, and, if practicable, to also arrange for its exhibition to the public.

In pursuance with this determination the chief taxidermist was directed to accompany Fish Commission Car No. 1, Mr. J. Frank Ellis, messenger, on its autumn trip to the Pacific coast, for the purpose of collecting and bringing back as many specimens of mammals as could be secured by gift, or purchased at nominal prices. This trip occupied a month, from October 8th to November 9th, during which Car No. 1 visited St. Paul, Minnesota; Fargo and Mandan, Dakota; Helena, Montana; Tacoma, Washington Territory; Portland, Oregon; Salt Lake City, Utah; and Cheyenne, Wyoming. At all of these points living specimens were acquired, both by gift and purchase, until the total number of acquisitions amounted to seventeen. The following were the objects which formed the nucleus of the present collection of living animals:

Vulpes fulvus fulvus, Red Fox. Gift of O. V. Davis, Mandan, Dakota.

Ursus americanus cinnamomum, Cinnamon Bear. Purchased at Helena, Montana.

Cariacus virginianus, White-tailed Deer. Purchased at Helena, Montana.

Cynomys ludovicianus, Prairie Dog. Gift of Carl Steinmetz, Helena, Montana.

Cariacus columbianus, Columbian Black-tailed Deer. Purchased at Media, Washington Territory.

Vulpes fulvus decussatus, Cross Fox. Gift of John Melville, Portland, Oregon.

Cariacus macrotis, Mule Deer. Purchased at Mountain Home, Idaho.

Taxidea americana, (2) Badger. Gift of Dr. C. W. Higgins, Salt Lake City, Utah.

Vulpes fulvus fulvus, Red Fox. Gift of Dr. C. W. Higgins, Salt Lake City, Utah.

Aquila chrysaetos, Golden Eagle. Gift of Dr. C. W. Higgins, Salt Lake City, Utah.

Lynx maculatus, Spotted Lynx. Purchased of Dr. C. W. Higgins, Salt Lake City, Utah.

Cynomys ludovicianus, (4) Prairie Dog. Purchased at Cheyenne, Wyoming Territory.

This collection filled up all the available space in the car on its return trip, and the transportation of so many large objects was only possible through the disinterested courtesy and untiring co-operation of Mr. Ellis and his assistant, Mr. R. S. Johnson.

Upon the arrival of this collection at the Museum it was decided to assign space for it in one end of a temporary wooden structure that had just been erected on the south side of the eastern wing of the Smithsonian, of materials from the old demolished New Orleans annex building. Its dimensions were 25 by 106 feet. This rough building was fitted up with heating apparatus, a number of temporary cages were made, the collection duly installed, and opened to the public on December 31, 1887. It immediately became quite popular with the public. Many valuable gifts were offered and accepted, and a number of desirable small objects, which were offered to the Institution at nominal prices, were purchased and added to the collection. Among the earliest gifts were an unusually large and fine jaguar from Mr. J. W. Riddle, of Eagle Pass, Texas, and two black bears from Mr. J. J. E. Lindberg, of El Paso, Texas.

By the end of January the collection had increased to a total of fifty-eight specimens of mammals and birds, many of which were rare and valuable. It was found that the collection demanded the constant attention of an experienced keeper, not only for the proper care and feeding of the animals, but also to protect them from annoyance at the hands of a certain class of visitors. Accordingly, on February 1, Mr. N. R. Wood was engaged to do duty in the above capacity.

During the months of February and March the collection nearly doubled in point of numbers, and rendered it absolutely necessary to occupy the whole of the building in which it was temporarily installed. A bear pit was built for the black bears at the western end; a large cage was built in the center for the cinnamon bear, and beside it a still larger cage with several compartments was constructed to accommodate the large birds of prey—eagles, owls, and vultures. As gifts were received temporary cages were hastily constructed for their accommodation, and every effort was made to make the best showing possible under the circumstances.

With the rapid increase in the size and value of the collection came an increase in the amount of labor and attention it absolutely required.

But for the valuable and indefatigable service which has been voluntarily entered upon, chiefly as a personal favor, by Mr. W. C. Weeden, in addition to his duties as assistant engineer, the Department of Living Animals would have suffered very serious embarrassment, and the curator gladly acknowledges the value and gratifying nature of the services thus rendered from February to the close of the fiscal year.

In the month of April a fine pair of buffaloes, a bull four years of age and a three-year-old cow, then on a cattle ranch in Nebraska, were purchased by Mr. E. G. Blackford, of New York, and presented to the National Museum as the nucleus of a small herd. This very valuable gift was gladly accepted, and Mr. Joseph Palmer was dispatched to North Platte, Nebraska, to take charge of the animals and bring them safely to Washington. This difficult task was accomplished with gratifying success and economy, and the two highly prized specimens reached the Institution in fine condition on May 10. In anticipation of their wants, and to provide good accommodations for the four deer then in the collection, a small barn with several yards around it had been constructed on the south end of the ellipse lying in the angle between the Smithsonian and the National Museum buildings. While this structure is by no means conspicuous or unpleasing in design, the building and yards attached afford reasonably good temporary accommodations, not only for the buffaloes and deer already occupying them, but they can also receive a very small number of each in addition without being crowded. The barn affords dry quarters for the animals during rainy weather, cool shade during hot weather, a suitable outfit for feeding, and also storage room for feed.

On May 12 the chief taxidermist was appointed curator of the Department of Living Animals.

REVIEW OF ACCESSIONS.

The accession statistics of the Department afford an interesting index of the interest manifested in it on the part of the general public. In the beginning it was predicted that one-half the specimens necessary for the various collections would be offered as gifts. The following is a statement of the whole number of living animals acquired from October 8, 1887, to June 30, 1888, and the manner of their acquisition :

	Received as gifts.	Purchased.	Bred in menagerie.	Total.	No. of species rep- resented.
Mammals	42	32	.....	74	30
Birds	56	5	11	72	28
Reptiles	25	1	.....	26	10
Total	123	38	11	172	68

It is worthy of note that of all the specimens not bred in the menagerie more than three times as many were received by gift as it was necessary to purchase. Furthermore, of the one hundred and twenty-three specimens received by presentation, about three-fourths were offered voluntarily, and without either suggestion or personal solicitation from the curator. The actual cash value of all the gifts is at least six times that of all the specimens purchased.

In addition to the gifts mentioned in the list already given, the most noteworthy mammals are the following: A fine pair of American bison from Mr. E. G. Blackford, New York; a very large male jaguar from Mr. J. W. Riddle, Eagle Pass, Texas; two black bears from Mr. J. J. E. Lindberg, El Paso, Texas; a male Virginia deer from Captain R. L. Hoxie, Montgomery, Alabama, and a female of the same species from Dr. P. Glennan, Washington, District of Columbia; two black bear cubs from Mr. J. S. Miller, Commissioner of Internal Revenue, Washington; a coyote from Mr. F. D. Nowell, North Platte, Nebraska; a gray wolf from Mr. C. A. Dole, Glendive, Montana; a grivet monkey from Mr. L. Moxley, Washington, and an exceedingly interesting Mexican spider monkey (*Ateles vellerosus*) from Mr. C. H. Townsend, U. S. Fish Commission steamer *Albatross*; a gray fox from Mr. George E. Brown, Alexandria, Virginia.

Of the many rare and interesting birds presented, it is impossible to mention here the names of even the most valuable objects, but a complete list of all the gifts will be found appended to this report.

Among the specimens purchased the most interesting were a puma from Fort Keogh, and a "silver-tip" grizzly bear cub from Billings, Montana; a fine black bear from South Carolina, received from Dr. G. E. Manigault in exchange, and the deer and spotted lynxes mentioned in the list of specimens which were procured on the trip to the Pacific coast. During the month of June a beginning was made toward the formation of a collection of living reptiles, but since nothing worthy of mention was accomplished until after June 30, the record of the work done properly belongs to the next report.

Among the small and more common species of mammals and birds there have been several deaths, but the only loss of any importance during the eight months was that of the two spotted lynxes (*Lynx maculatus*), obtained in Salt Lake City. During the early part of the winter, before the heating apparatus was in satisfactory order, the female of the pair died of pneumonia, and the male succumbed a few days later to uræmic poisoning. Owing to the flimsy nature of some of our temporary cages several opossums and two woodchucks escaped, and, still more to be regretted, six quails and a pair of gambels partridges were killed in one night by rats, with which the menagerie building is still completely infested, in spite of the great numbers that have been caught, killed, and fed to the birds of prey.

ROUTINE WORK.

The daily care which the animals in the collection demanded in proper feeding and thorough cleaning has required the undivided attention of the two keepers mentioned above, with daily assistance from a laborer. Quite a number of the birds and mammals are young, and all such require to be fed from three to five times daily, on food specially adapted to their respective wants. With the exception of the reptiles, each species in the entire collection has been labeled, and although in the beginning the curator made a determined effort to exhibit with each mammalian species a map showing its geographical distribution, the rapid increase in the size and importance of the collection overwhelmed him with more imperative duties, and it was found impossible to carry out that plan at present. During the last four months of the fiscal year only four specimens were purchased, and it required diligent exertions to provide proper accommodations for the gifts that came in from day to day. Notwithstanding the disadvantages the department labors under by reason of the temporary nature of nearly all of its appointments, the crowded condition of the building and the small size of most of the cages, the healthy condition of the animals and the general cleanliness of the establishment attest the energy and vigilance of the keepers.

As a measure of economy in the matter of feed, several tons of fine clover hay have been saved from the haying operations conducted on the Smithsonian Grounds by the Department of Public Buildings and Grounds, and stacked near the carp pounds for future use in feeding our ruminants. The saving thus effected will not fall far short of \$150. During the entire grass-cutting season the buffaloes and deer have been fed chiefly on fresh grass from the grounds.

TRANSPORTATION.

Inasmuch as the ordinary rules of the express companies require payment for certain classes of live animals at from two to four times the amount of ordinary rates, Mr. S. C. Brown, registrar of the National Museum, undertook to secure certain concessions from various express companies, north and south. After considerable correspondence the Adams Express Company refused to make any concession whatever, thereby reserving its right to charge from one to four rates on live animals, as it sees fit, which in many cases is a prohibitive tariff. The United States Express Company (now including also the Baltimore and Ohio Company) was more generous, and in view of the laudable nature of the object in view, and the fact that the collections will always be free to the public, the general manager of that company has authorized all its agents to ship live animals of all kinds to this Institution at one ordinary merchandise rate. This generous concession will be of great

value to us in building up the collection of living animals, and all collectors and correspondents who may desire to forward specimens to us are requested to ship by the United States Express Company (or the Baltimore and Ohio) in preference to the Adams or the Southern Express Company.

Up to date no researches worthy of mention have been made, the attention of the curator having been fully occupied in duties of a practical nature. The growth of the young bears in the collection, which now contains examples of three species, has been watched with interest with a view to obtaining some exact data throwing light on the relations borne by the black bear, cinnamon, and grizzly to each other. The position of the cinnamon bear being involved in considerable doubt, it is very desirable to study the development of the three species under favorable conditions.

The most important result accomplished thus far by our collection of living animals has been in emphasizing the great need of a national zoological garden, established in the city of Washington. The many hundreds of eager visitors who daily crowd our menagerie building to the point of positive discomfort, and the numerous gifts which come to us unsought, have led Senator J. B. Beck to introduce in the United States Senate a bill "for the establishment of a zoological park in the District of Columbia for the advancement of science, and the instruction and recreation of the people," and appropriating therefor, as an initial appropriation, the sum of \$200,000. By direction of the Secretary of the Smithsonian Institution, and also in pursuance of the desire of Senator Beck, the curator has exerted his utmost efforts to help bring about the consummation of that much-desired and highly laudable end.

A very noticeable portion of the time of the curator has been taken up by certain investigations and the preparation of various reports that have been called for by the Secretary and Assistant Secretary, and prepared accordingly, for publication or otherwise. The following have been submitted:

A brief report on the results of the Smithsonian expedition for American Bison.

A full report of the same, with a map.

A report of investigations made in regard to the protection of game in the Yellowstone National Park, illustrated by a specially prepared map.

A plan, with estimates of cost, for a national zoological garden, to be located in the District of Columbia.

A paper on the extermination of the American Bison, with maps and illustrations (not quite completed during the year).

EXHIBIT AT THE CINCINNATI EXPOSITION.

In order to call the attention of the public to the fact that several important species of North American mammals have already been exterminated by man, and many others are rapidly going the same way, the curator prepared during the month of June a special exhibit to

illustrate the extermination of American quadrupeds. This exhibit was composed of the following features:

A series of mounted specimens of such mammals as already have been exterminated and others that are rapidly approaching extinction. The species represented were as follows: American bison, West Indian seal, California elephant seal, walrus, moose, elk, mountain goat, mountain sheep, antelope, and beaver.

A series of paintings and photographic pictures of large size, illustrating the methods by which the American bison has been exterminated.

A series of specimens and a large oil painting showing what remains to-day of the bison, skeletons bleaching on the western prairies.

A series of raw buffalo skins as representing the objects for which the bison—was exterminated.

A collection of modern weapons of destruction, including examples of nearly all American sporting rifles.

A lot of seventy skins of the rare and little-known Rocky Mountain goat, which were taken by pot-hunters and sold in Denver at 50 cents each.

This exhibit occupied 800 square feet of floor space.

RECOMMENDATIONS.

At present the most serious drawback under which the Department labors is the lack of space in the menagerie building for the proper comfort of the visitors who daily visit the collection. For weeks in succession the daily throng has been so great as to make it a matter of difficulty to pass through the building, or even to perform necessary work in connection with the care of the animals. It has several times been estimated that between two and three thousand visitors have viewed the collection in that small and rudely constructed building in a single day.

At first an undesirable and disorderly element threatened to completely crowd out all other visitors, and it became necessary to station a watchman in the building to compel the small-boy element to depart after a reasonable time. The character of the visitors in daily attendance is in the highest degree complimentary to the experiment of opening this collection to the public, and causes a constant regret that it is impracticable, if not also impossible, to provide ample room for the comfort of visitors and also to have all the appointments of the collection of the highest order of excellence.

Mr. W. C. Weeden is liable to be detached from service in this department at any time. It is earnestly hoped by the curator that since his continuous services are imperatively needed in the menagerie, he may be transferred to this department and regularly appointed as a keeper.

LIST OF ACCESSIONS TO THE DEPARTMENT OF LIVING ANIMALS FROM
OCTOBER 8, 1887, TO JUNE, 1888.

MAMMALS.

BY GIFT.

- Buffalo (2) (*Bison americanus*). E. G. Blackford, New York.
 Virginia Deer (*Cariacus virginianus*). Dr. P. Glennan, Washington, District of Columbia.
 Virginia Deer (*Cariacus virginianus*). Capt. R. L. Hoxie, Montgomery, Alabama.
 Jaguar (*Felis onca*). J. W. Riddle, Eagle Pass, Texas.
 Black Bear (2) (*Ursus americanus*). J. J. E. Lindberg, El Paso, Texas.
 Grivet Monkey (*Cercopithecus enyithia*). L. Moxley, Washington, District of Columbia.
 Red Fox (*Vulpes fulvus fulvus*). O. V. Davis, Mandan, Dakota.
 Cross Fox (*Vulpes fulvus decussatus*). John Melville, Portland, Oregon.
 Red Fox (*Vulpes fulvus fulvus*). Dr. C. W. Higgins, Salt Lake City.
 Gray Fox (*Urocyon virginianus*). George E. Brown, Alexandria, Virginia.
 Coyote (*Canis latrans*). Fred. D. Nowell, North Platte, Nebraska.
 Prairie Dog (*Cynomys ludovicianus*). Carl Steinmetz, Helena, Montana.
 Badger (2) (*Taxidea americana*). Dr. C. W. Higgins, Salt Lake City.
 Gray Squirrel (*Sciurus carolinensis*). Fred. C. Ohm, Washington, District of Columbia.
 Opossum (*Didelphys virginianus*). Dr. C. Hart Merriam, Washington, District of Columbia.
 Opossum (*Didelphys virginianus*). J. O. Boggs, Washington, District of Columbia.
 Opossum (*Didelphys virginianus*). W. J. Yaste, Bureau of Ethnology, Washington, District of Columbia.
 Gray Squirrel (3) (*Sciurus carolinensis carolinensis*). Joseph Palmer, Arlington, Virginia.
 Ferret (2) (*Putorius furo*). Louis Schmid, Washington, District of Columbia.
 Cavy or Guinea-Pig (2) (*Cavia aperia*). G. H. H. Moore, U. S. Fish Commission.
 Opossum (*Didelphys virginianus*). Eppa Hunton Coumbe, Washington, District of Columbia.
 White Rat (*Mus rattus*). Master Clinton Thorne, Washington, District of Columbia.
 Raccoon (*Procyon lotor*). George Boulding, Washington, District of Columbia.
 Opossum (*Didelphys virginianus*). Clifford U. Smith, Washington, District of Columbia.
 Tame Hare (*Lepus vulgaris*). Jos. Mace, Smithsonian Institution, Washington, District of Columbia.
 Tame Hare (*Lepus vulgaris*). Louis A. Schmid, Washington, District of Columbia.
 Red Squirrel (*Sciurus hudsonius*). Orlando G. Wales, Washington, District of Columbia.
 Opossum (*Didelphys virginianus*). W. H. Babcock, Washington, District of Columbia.
 Gray Squirrel (*Sciurus carolinensis*). R. H. G. Bouis, Washington, District of Columbia.
 Fox Squirrel (*Sciurus niger cinereus*). H. E. Hinman, Cleveland, Ohio.
 Chipmunk (2) (*Tamias striatus*). Alex. McVeigh Miller, Alderson, West Virginia.
 Porcupine (*Erethizon dorsatus*). Pettit & Dripps, Washington, District of Columbia.
 Woodchucks (3) (*Arctomys monax*). T. L. Ostrander, Wells, New York.

BY PURCHASE.

- White-Tailed Deer (*Cariacus virginianus*). At Helena, Montana.
 Columbian Black-Tailed Deer (*Cariacus columbianus*). R. C. Hewitt, Media, Washington Territory.
 Mule Deer (*Cariacus macrotis*). Dr. C. A. Gay, Lewiston, Idaho.
 Spotted Lynx (*Lynx maculatus*). Dr. C. W. Higgins, Salt Lake City.
 Panther (*Felis concolor*). Capt. Henry Romeyn, Fort Keogh, Montana.
 Cinnamon Bear (*Ursus americanus cinnamomum*). From Helena, Montana.
 Grizzly Bear, cub (*Ursus horribilis*). R. T. Allen, Billings, Montana.
 Gray Fox (*Urocyon virginianus virginianus*). From Macon, Georgia.
 Prairie Dog (4) (*Cynomys ludovicianus*). Geo. L. Taylor, Cheyenne, Wyoming.
 Raccoon (2) (*Procyon lotor*). From Macon, Georgia, and Jacksonville, Florida.
 Opossum (*Didelphys virginianus*). From Atlanta, Georgia.
 Gray Squirrel (2) (*Sciurus carolinensis*). From Prince George County, Maryland.
 Flying Squirrel (2) (*Sciuropterus volucella volucella*). From Prince George County, Maryland.
 Flying Squirrel (7) (*Sciuropterus volucella volucella*). From Prince George County, Maryland.
 Opossum (*Didelphys virginianus*). Dr. W. T. Owsley, Glasgow, Kentucky.
 Opossum (*Didelphys virginianus*). Geo. F. Pollock, Washington, District of Columbia.
 Woodchuck (2) (*Arctomys monax*). L. D. Terrell, U. S. Fish Commission.

BY EXCHANGE.

- Carolina Black Bear (*Ursus americanus*). Dr. G. E. Manigault, Charleston, South Carolina.

BRED.

- Tame Hare (4) (*Lepus vulgaris*).

BIRDS.

BY GIFT.

- Golden Eagle (*Aquila chrysaetos*). Dr. C. W. Higgins, Salt Lake City.
 Golden Eagle (*Aquila chrysaetos*). President Cleveland, Executive Mansion.
 Bald Eagle (*Haliaeetus leucocephalus*). Colonel Shutt, Virginia.
 Great Blue Heron (2) (*Ardea herodias*). U. S. Fish Commission, Havre de Grace, Maryland.
 Turkey Vulture (2) (*Cathartes aura*). G. L. Machenheimer, Forest Glen, Maryland.
 Macaw (*Ara macao*). Alfred W. Cochran, Alabama.
 Rough-legged Hawk (*Archibuteo sancti-johannis*). Vinal Edwards, Wood's Holl, Massachusetts.
 Red-tailed Hawk (*Buteo borealis*). R. H. Boswell, Washington, District of Columbia.
 Cooper's Hawk (*Accipiter cooperi*). John J. Sellner, Prince George's County, Maryland.
 Sparrow Hawk (*Falco sparverius*). John W. Reed, Gaithersburgh, Maryland.
 Red-tailed Hawk (*Buteo borealis*). Miss Lizzie Kuehling, Fairfax County, Virginia.
 Sparrow Hawk (*Falco sparverius*). Alfred Heitmüller, Brightwood road, District of Columbia.
 Red-tailed Hawk (*Buteo borealis*). G. L. Machenheimer, Forest Glen, Maryland.
 Barred Owl (*Strix nebulosa*). From Jacksonville, Florida.
 Screech Owl (*Megascops asio*). J. E. Brown, Washington, District of Columbia.
 Great Horned Owl (*Bubo virginianus*). Mr. Robert Ridgway, U. S. National Museum.
 Screech Owl (*Megascops asio*). August Gedz, Washington, District of Columbia.
 Barn Owl (*Strix pratincta*). Walter H. Stoutenburg, Washington Insane Asylum,

- Long-eared Owl (*Asio wilsonianus*). W. S. Anderson, Washington, District of Columbia.
- Barred Owl (2) (*Strix nebulosa*). George A. Riker, Alexandria, Virginia.
- Screech Owl (4) (*Megascops asio*). C. Edgar Uber, Falls Church, Virginia.
- Screech Owl (*Megascops asio*). Mr. Alfred Ray, Forest Glen, Maryland.
- Great Horned Owl (*Bubo virginianus*). Dr. J. Schneck, Mount Carmel, Illinois.
- Barred Owl (2) (*Strix nebulosa*). Mrs. J. B. Eustis, Washington, District of Columbia.
- Loon (*Urinator imber*). Charles B. Gant, Washington, District of Columbia.
- Crow (*Corvus americanus*). Nelson R. Wood, National Museum.
- Crow (*Corvus americanus*). Joseph Palmer, U. S. National Museum.
- Gambel's Partridge (2) (*Callipepla gambeli*). Louis Schmid, Washington, District of Columbia.
- Bob-white (6) (*Colinus virginianus*). James W. Walker, Washington, District of Columbia.
- Virginia Quail (9) (*Colinus virginianus*).
- Red Crossbill (*Loxia curvirostra*). Dr. A. K. Fisher, Department of Agriculture.
- Red Crossbill (2) (*Loxia curvirostra*). Henry Horan, U. S. National Museum.
- Woodcock (*Philohela minor*). W. F. Johnson, Bladeburg, Maryland.

BY PURCHASE.

- Turkey Vulture (3) (*Cathartes aura*). G. L. Machenheimer, Forest Glen, Maryland.
- Cooper's Hawk (*Accipiter cooperi*). Washington Market.

DEPOSITED.

- Homing Pigeon (2) (*Columba livia*). N. R. Wood, National Museum.
- Quail (2) (*Colinus virginianus*). N. R. Wood, National Museum.
- Ring Doves (2) (*Columba* sp.). N. R. Wood, National Museum.
- Australian Grass Parroquet (2) (*Melopsittacus undulatus*). N. R. Wood, National Museum.
- Black Fantailed Pigeon (2) (*Columba* sp.). W. C. Weeden, National Museum.
- Common Pigeon (2) (*Columba* sp.). W. C. Weeden, National Museum.
- Ground Dove (2) (*Columbigallina passerina*). N. R. Wood, National Museum.
- Homing Pigeon (4) (*Columba livia*). N. R. Wood, National Museum.

REPTILES.

BY GIFT.

- Box Tortoise (*Cistudo carolina*). Alex. McVeigh Miller, Alderson, Virginia.
- Gray Monitor (2) (*Varanus griseus*). W. A. Conklin, Central Park Menagerie, New York.
- Three-toed Box Tortoise (2) (*Terrapene triunguis*). Robert T. Hill, U. S. Geological Survey.
- Collared Lizard (*Crotaphytus collaris*). Department of Reptiles, National Museum.
- Banded Rattlesnake (3) (*Crotalus horridus*). Department of Reptiles, National Museum.
- Scarlet King Snake (*Ophibolus doliatus doliatus*). W. C. Weeden, National Museum.
- Black Snake (2) (*Bascanium constrictor*). Joseph Palmer, National Museum.
- Garter Snake (*Eutania sirtalis sirtalis*). William Palmer, National Museum.
- Garter Snake (*Eutania sirtalis sirtalis*). Miss Gertrude Johnson, Washington, District of Columbia.
- Blowing Viper (*Heterodon platyrhinus platyrhinus*). E. S. Rheem, National Museum.
- Water Moccasin (5) (*Tropidonotus sipedon sipedon*). W. C. Weeden, National Museum.
- Garter Snake (5) (*Eutania sirtalis sirtalis*). W. C. Weeden, National Museum.

BY PURCHASE.

- Box Tortoise (*Cistudo carolina*). Dr. W. T. Owsley, Glasgow, Kentucky.

SECTION III.

PAPERS DESCRIBING AND ILLUSTRATING THE COLLECTIONS IN THE U. S. NATIONAL MUSEUM.

	Pages.
1. The Coast Indians of Southern Alaska and Northern British Columbia. By ALBERT P. NIBLACK, Ensign, U. S. Navy.....	225-386
2. A Catalogue of the Hippisley Collection of Chinese Porcelains: With a sketch of the History of the Ceramic Art in China. By ALFRED E. HIPPISELEY, of the Imperial Chinese Customs Service.....	387-491
3. The Expedition to Funk Island, with Observations upon the History and Anatomy of the Great Auk. By FREDERIC A. LUCAS.....	493-529
4. Fire-making Apparatus in the U. S. National Museum. By WALTER HOUGH.....	531-587
5. The Collection of Korean Mortuary Pottery in the U. S. National Museum. By PIERRE LOUIS JOUY.....	589-596
6. A Study of Prehistoric Anthropology. By THOMAS WILSON.....	597-671
7. Ancient Indian Matting from Petit Anse Island, Louisiana. By THOMAS WILSON.....	673-675
8. Results of an Inquiry as to the Existence of Man in North America during the Paleolithic Period of the Stone Age. By THOMAS WILSON.....	677-702

THE COAST INDIANS OF SOUTHERN ALASKA AND
NORTHERN BRITISH COLUMBIA.

By Ensign ALBERT P. NIBLACK, U. S. Navy.

BASED ON THE COLLECTIONS IN THE U. S. NATIONAL MUSEUM, AND ON
THE PERSONAL OBSERVATION OF THE WRITER IN CONNEC-
TION WITH THE SURVEY OF ALASKA IN THE SEASONS
OF 1885, 1886 AND 1887.



SYNOPSIS OF CONTENTS.

- I. CHOROGRAPHY OF SOUTHERN ALASKA AND NORTHERN BRITISH COLUMBIA; Progress of Ethnological work in this region,—Scope of this paper,—Classification of Indian stocks,—History.
- II. ENVIRONMENT: Organic and inorganic. CHARACTERISTICS OF INDIANS: Physical, emotional, intellectual, moral, and æsthetic characteristics.
- III. REGULATIVE ORGANIZATION: Consanguineal, Political, and Industrial. Origin of “mother-rule” and “father-rule”—Totemism and Tribal organization: Tlingit, Kaigani, Haida, and Tsimshian Totems—Origin of Totemism—Chiefs and petty chiefs, freemen, and slaves—Division of labor—Inheritance and rights of property.
- IV. MUTILATIONS: Lip, ear, and nose ornaments; tattooing; painting the body. ORNAMENTS: Necklaces, pendants, and bracelets. PRIMITIVE CLOTHING: ceremonial blankets and head-dresses; the art of weaving; modern dress; rain cloaks; armor; helmets and head-dresses; masks; batons; blankets; coats; leggings; slave-killers; ceremonial paraphernalia in general.
- V. FOOD: Its preparation and procurement. IMPLEMENTS AND WEAPONS: Industrial implements and tools; hammers and mauls; adzes; knives; scrapers; mortars and pestles; wedges; chisels; drills; paint-brushes; weapons of war and of the chase; clubs; daggers; bows and arrows; spears; fur-seal spears; salmon spears; fishhooks; fish-rakes; fish-baskets; lines; floats; drag-nets; dip-nets; weirs; bird and other land traps; canoes; canoe outfits; canoe-making. HUNTING AND FISHING: Salmon; halibut; herring and eulachon; spawn; sea otter; seals; deer; mountain goats and sheep; bears.
- VI. LANDWORKS: Fortifications. TEMPORARY DWELLINGS: Tents and summer houses. HOUSES: Details of house construction. VILLAGES: Names of villages; groups of villages; residence.
- VII. ARTS AND INDUSTRIES: Raw materials; ropes and cords; mats; baskets; dishes; spoons; household boxes and chests; cradles; household utensils; paints; metal working; lumber and wood-work. PAINTINGS, DRAWINGS, AND CARVINGS: Totemic and commemorative columns. MUSIC: Singing; drums, rattles and whistles.
- VIII. PRODUCTIONS: Rearing and cultivation. LOCOMOTION: Canoe travel. WEALTH: Currency; property in land; coppers; slaves. TRADE: Exchange of commodities.
- IX. WAR AND PEACE: War customs: scalping; duels. Peace customs: treaties of peace.
- X. VICES AND DEMORALIZATION OF THE INDIANS: Gambling; rum; hoochinoo; tobacco; immorality.
- XI. SHAMANISM: Witchcraft trial; superstition; sickness and death; medicines; treatment of the sick.

- XII. MORTUARY CUSTOMS: Ancient sepulture; depositories of ashes; mortuary columns; customs of the Tlingit, Haida, and Tsimshian; modern customs; Christian burial; Shaman burial.
- XIII. FEASTS. DANCES. CEREMONIES. POTLACHES. THEATRICALS. INITIATORY CEREMONIES: Marriage; childbirth; naming; piercing the ears and nose; tattooing; puberty; bringing out; self-naming; chieftaincy; glorification of the dead. FESTIVE CEREMONIES: Welcome; trade; house-building; potlaches; ceremonial dances; "cultus" dances; theatricals.
- XIV. GENERAL CHARACTER OF THE TRADITIONS. MYTHS AND FOLK-LORE—BIBLIOGRAPHY.
- XV. GENERAL NOTES: Relations and affinities of the Tlingit, Haida, Tsimshian, and Kwakiutl—the Haida—Remarks on the Maori of New Zealand—the Kaigani—Ethnological work to be done.*
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- * To complete, in a measure, the study of the ethnology of this region, there should be added several other chapters. The data at hand does not, however, just yet warrant this undertaking. Chapter XIV, and others of the above, are very incomplete. In itself Chapter XIV would take several volumes to cover the ground satisfactorily. A synopsis of the chapters needed is appended to indicate their scope.
- XVI. CREED AND CULT: Superstitions; religious beliefs and practices; religious organization: regulative, Shamanism; operative, fetichism. Shamanistic priestcraft; paraphernalia; religious rites of the Shaman. Secret and religious organizations in the tribe; the relations of the ceremonies to the religious beliefs.
- XVII. LANGUAGE OF THE VARIOUS INDIAN STOCKS: grammatical structure; vocabularies; dialects; linguistic affinities of the different stocks.
- XVIII. Ethnical affinities and relationships of the various Indian stocks of the North West Coast as far as indicated by all the foregoing.
- The collection made by Lieut. George F. Emmons, U. S. Navy, in southeastern Alaska, now in the possession of the American Museum of Natural History, New York City, has been drawn upon for twenty or more illustrations. His collection admirably supplements that in the National Museum, and it is to be regretted that the two collections have not been brought together.

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THE COAST INDIANS OF SOUTHERN ALASKA AND NORTHERN BRITISH COLUMBIA.

By Ensign ALBERT P. NIBLACK, *U. S. Navy.*

I.

CHOROGRAPHY OF SOUTHERN ALASKA AND NORTHERN BRITISH COLUMBIA.

From Puget Sound in Washington Territory to Mount St. Elias in southern Alaska, the coast line is broken into a continuous archipelago. The Cascade Mountains, running throughout this territory parallel to the coast line, leaves, adjacent to the Pacific, a strip of country about 150 miles broad and 1,000 miles long, called generally "The North West Coast." Through the narrow channels of this archipelago winds the steamer route to Sitka, a route unparalleled for its length and the wild magnificence of its scenery. Warmed by Asiatic currents and moistened by a phenomenal rain fall, this region is less rigorous in its climate than generally supposed. Thickly wooded with pine, fir, spruce, and hemlock, the vegetation spreads from the water's edge to the snow line limit of the loftiest mountains. The forests are stocked with game and the waters with food fishes. The soil, though not deep, is fertile, and would itself support the native population without the other gifts with which nature has so lavishly endowed them. In every crevice in the rocks, where the soil is scantiest, a stunted tree rears its head. In the spring the forests are gay with ferns, shrubs, and brightly colored wild flowers, and in the summer a large variety of edible roots and berries are found in profusion.

Dotted throughout this region are the winter villages of the Coast Indians, whose ethnic variations are somewhat marked as we go north, but who differ as a group quite materially from the hunting Indians of the interior, and more sharply from the Eskimo. In contrast with the fierce, revengeful Tinné, they are generally mild in disposition. In physical characteristics they are shorter, the cheek bones are less prominent, the nose is straighter, and the face rounder and fuller. From

the Columbia River to Mount St. Elias these Coast Indians have marked ethnic affiliations, but the linguistic variations are great, and in the southern region are now the subject of systematic governmental investigation.

Comparative philology and mythology, a study of the primitive customs and habits of the geographical and linguistic groups, and comparisons of the ethnological material and collections from this region, can alone throw light upon the history and ethnic affinities of the various Indian stocks.

ETHNOLOGICAL RESEARCH IN BRITISH COLUMBIA.

In British Columbia, the philological and mythological part of the work has been commenced by Dr. W. F. Tolmie and Prof. George M. Dawson, in connection with the geological and natural history survey of Canada, and is now the subject of special investigation by a committee of the British Association for the Advancement of Science, under a grant for the purpose. Dr. Franz Boas is conducting the work for the committee in the field, and the result is being from time to time published.

For Washington Territory and Alaska, this investigation is in the hands of the Bureau of Ethnology of the Smithsonian Institution.

SCOPE OF THIS PAPER.

The facts here published were gathered by the writer in the summer seasons (May to October inclusive) of 1885, 1886, and 1887, while on duty in the survey of Alaska now being carried on by the officers of the Navy, under the direction of the U. S. Coast and Geodetic Survey. The material presented has little bearing on the philology and mythology of the region embraced in the survey. Such work must come later, be undertaken more systematically, and carried on in the winter months, when the Indians are located in their permanent villages. The writer is indebted to Judge J. G. Swan, of Port Townsend, Washington Territory, for valuable notes on the Haida of Queen Charlotte Islands. His collections from the North West Coast, under the direction of the Smithsonian Institution, form the bulk of the ethnological material in the National Museum from the region about Dixon entrance, and have been freely used in the accompanying illustrations.

CLASSIFICATION.

A provisional classification of the Indians of the North West Coast, from Puget Sound to Cape St. Elias, based on philological considerations, would, according to Dr. Franz Boas, divide them into three groups, as follows :

Group I. Salish, Kwakiutl, and Wakashan (Nutkan).

Group II. Tsimshian.

Group III. Tlingit and Haida.

"It seems that the languages enumerated above represent as many different linguistic stocks, so far as our limited knowledge extends."*

A classification based on other than philological and geographical groupings is out of the question at present. A comparative study of the customs, habits, mythology, and beliefs of all the tribes of this region can alone form the basis of an ethnological classification. Charts I and II show the location of the different Indian stocks on the North West Coast. This paper deals principally with the tribes around Dixon entrance, and in our own Territory of Alaska, of which Chart I shows the geographical grouping into stocks. The Kaigani, on the southern part of Prince of Wales Island, are a branch of the Haidan stock. On Annette Island, at Port Chester, will be seen the location of the Tsimshian emigrants. This is a colony that, in 1887, under the leadership of the missionary, Mr. Duncan, abandoned Metlah-Katlah-British Columbia, owing to difficulties with the civil and ecclesiastical authorities. The Indians seem very largely to have sympathised with the Rev. Mr. Duncan, as they voluntarily followed him to our own Territory, where the settlement is called New Metlah-Katlah.

In Chart II no attempt is made to enumerate the tribes comprising the different stocks. It is interesting, however, to observe that the Bilqula are Salishan.†

HISTORY.

European civilization has borne with crushing force upon the Indians of the Northwest coast. Demoralized and staggered by contact with the whites, the remnant of the former population is just beginning to rally from the blow. Nothing places the Northern tribes higher in the scale of intelligence than the philosophy with which they are adapting themselves to their changed environment, retaining their advantageous native customs and accepting from us only what contributes to their comfort and welfare. The greatest curse to them has been alcohol, and against this temptation they seem absolutely unable to struggle.

The early European voyagers to this region have preserved in their narratives rough accounts of the habits, customs, and actual condition of the natives. Our earliest acquaintance dates from the visit of Ber- ing in 1741, coming from the north. In 1774-'75 the Spanish navigators, Juan Perez and La Bodega y Quadra, coming from the south, explored the coast to the northward. In 1778 Captain Cook, having with him Vancouver as a midshipman, made his celebrated visit to this region. After that several mercantile companies sent ships thither to trade,

* Science, vol. XII., No. 299, p. 194.

† "Among the linguistic results of my journey the most interesting are the discovery of three unknown dialects of the Salish stock and the establishment of the fact that the Bilqula, who are of Salish lineage, must have lived at one time with other Salish tribes near the sea."—*Notes on Ethnology of British Columbia* (Am. Philolog. Soc., Nov. 18, 1887, p. 422), by Dr. Franz Boas.

notably Captain Meares (1786), of the East India Company, and Captains Portlock and Dixon (1787), of the King George's Sound Company. In 1788 several American ships, representing a Boston company, also appeared on the coast. In 1789 in the Washington, Captain Gray explored the east coast of Queen Charlotte Islands, and, in 1791, Captain Ingraham anchored in a harbor in the southeast part of this same archipelago. In the same year, Marchand, representing a French company, also traded with these islanders. .

In 1792-'94 Captain Vancouver made his admirable reconnaissance of the coast in search of a northwest passage to the Pacific from the Atlantic.

In 1793 Mackenzie descended the Salmon River and reached salt water in latitude $52^{\circ} 21' N.$, in the country of the Bilqula.

With the formal occupation, by Baránoff, of a fortified post at Sitka in 1800, the natives of the Northwest coast may be said to have entered upon a new phase in their civilization, due to contact with the whites. A few years later this post was destroyed and the occupants massacred by the Tlingit; but, in 1805, Baránoff and Lisiansky re-established it on the site now occupied by the town of Sitka, called by them New Archangel. From this time to the purchase of Alaska by the United States in 1867, the history of this region is largely the history of the Russian-American and the Hudson Bay Company, the latter of which still continues to be such a powerful commercial factor in British America.

II.

ENVIRONMENT—ORGANIC AND INORGANIC; AND CHARACTERISTICS OF THE INDIANS—PHYSICAL, EMOTIONAL, INTELLECTUAL, MORAL, AND ÆSTHETIC.

ENVIRONMENT.

The physical character of the region occupied by the Tlingit, Haida, and Tsimshian is similar in general to that of southern British Columbia, but for local reasons this area has a peculiar climate. A branch of the warm Japanese current sweeps along the coast, and, coming in contact with the colder air and water of the north, gives rise to excessive humidity, producing in summer the rains and fogs, and in winter the snows and sleets, that are so prevalent in this region. Thermometrical observations, extending over a period of fifty years in the region about Sitka, give the lowest winter temperature as 4° Fah. below zero, the mean winter temperature being about 33° Fah., the same as in Washington, District of Columbia. In the summer, on the contrary, the rainy and overcast days so predominate, that the temperature never rises above 90° Fah. The maximum recorded about Sitka is 87° Fah. With an annual rainfall of from 60 to 95 inches and an average of between one hundred and ninety and two hundred and eighty-five days in the year on which rain has been known to fall,* the climate may be said to have its drawbacks. The shortest winter days are from four to five hours long, while the summer nights are correspondingly brief. In the long summer days, when the weather is fine, the atmosphere is wonderfully clear, and the scenery fairly sparkles with an excessive brilliancy due to exceptional hygrometric conditions.

The territory is very broken and subdivided. It is densely wooded with spruce, hemlock, white pine, fir, birch, alder, and underbrush, the vegetation crowding down to the high-water line. It is also very mountainous, and indented with bays and arms of the sea. The waters are deep and the tidal currents swift, the tides rising and falling twice a day through a range of from 12 to 21 feet, making navigation in places extremely hazardous. Travel is entirely by water, the villages being on the water courses, and the canoe here reaches its highest development. Huge landslides in the face of the mountains, snow-capped ranges with sparkling glaciers in the sides and valleys, floating glacier ice in the bays and straits, and the bright green vegetation everywhere, all these give a characteristic beauty to the scenery of this region.

* Dall, Alaska, p. 451.

The principal fur-bearing animals are the brown and black bear, wolf, the cross, red, and silver fox; beaver, mink, marten, and land otter, while in the mountains of the mainland are wild goats and sheep. Cod, herring, trout, and eulachon abound in certain localities, but the staple supply is furnished by the halibut and salmon. To complete the picture there must be mentioned the innumerable flocks of wild ducks and geese in season, the lonely herons and cranes, the omnipresent gulls, eagles, hawks, crows, and ravens, the skimming surf birds, and, in the woods, not generally seen from canoes, grouse and a variety of smaller members of the feathered tribe.

In Dixon Entrance, Clarence, Sumner, and Chatham Straits, and particularly in Frederick Sound and Stephen's Passage, Alaska, is the breeding ground for whales, which may be seen spouting in schools of six or seven. Wherever the whale is, there also is found the whale-killer (*Orca ater*). These run also singly or in schools, and are the merciless enemy of the whale. The dorsal fin, projecting so prominently above the surface of the water, gives them a characteristic readily seized upon by the native artist, who never omits this appendage from his conventional drawing or carving of this animal.

The presence of the bear, eagle, raven, wolf, orca, whale, and other representatives of the animal kingdom in this region, and the knowledge of their peculiarities by the Indians, explain the prominent part they play in the mythology of the coast, as stated in Chapter VII.

PHYSICAL CHARACTERISTICS.

The Indians about Dixon Entrance are unquestionably superior in physique to the coast Indians to the southward. As among themselves the physical superiority rests with the Haida. This may be due to real ethnical differences, but is probably accounted for in the fact that natural conditions in the Queen Charlotte Islands and around such an exposed arm of the sea as Dixon Entrance have produced a finer and more robust people than those in less exposed regions. While there is considerable uniformity in the general physical characters of all the stocks on the northwest coast, a practised eye can detect the differences between them.

Langsdorff (1805) says of the Tlingit:

They do not appear to have the least affinity with the Mongol tribes; they have in general large, fiery eyes; a small, flat, broad nose; and large cheek-bones; indeed, in all respects, large and strongly marked features.*

In general amongst the Tlingit, Haida, and Tsimshian, the hair is thick, stiff, coarse, straight, and black. It is worn short by the men, excepting the shamans or doctors, and long by the women. Instances cited† of auburn tresses and golden curls are ascribable to intermixture with European and American traders. The eyebrows are small and the eyes generally black or brown, though gray eyes are to be seen.

*Langsdorff, Voyages, Part II, p. 112.

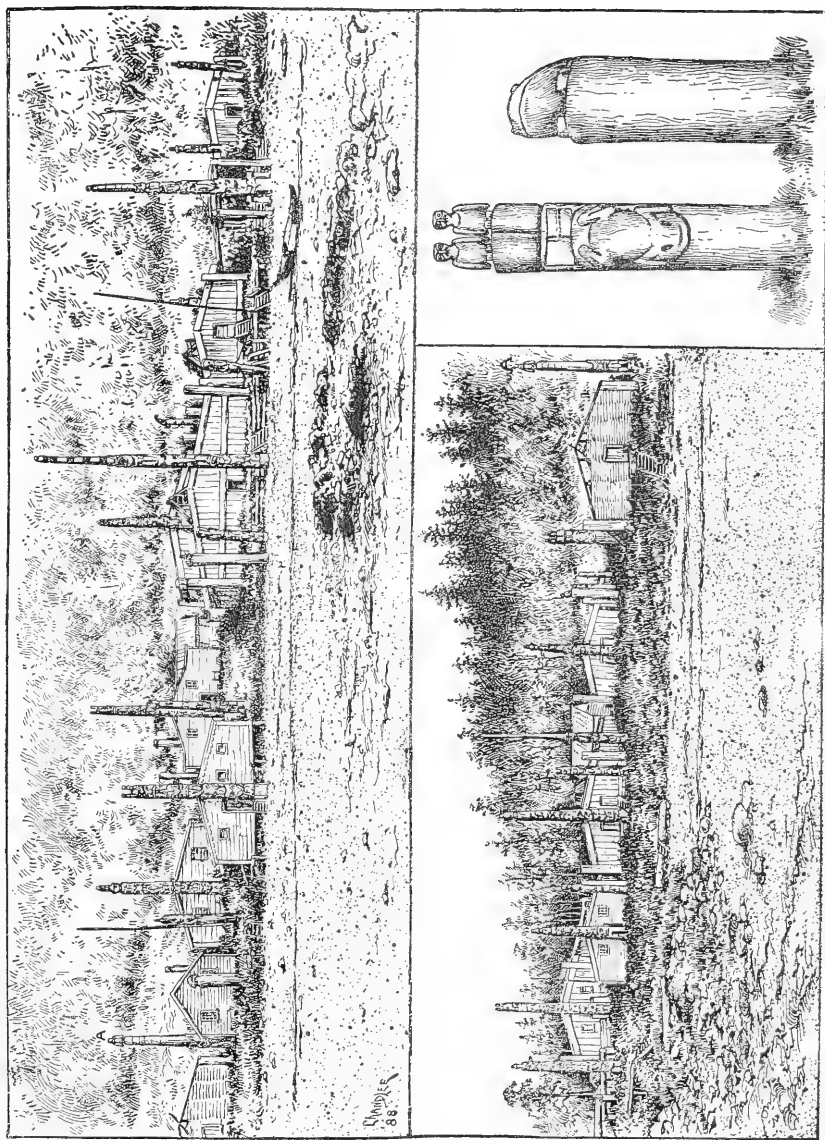
†Poole, Queen Charlotte Islands, p. 315.

EXPLANATION OF PLATE II.

VIEW OF THE EASTERN PART OF KASA-AN VILLAGE, PRINCE OF WALES ISLAND, ALASKA.

From photographs by the author.

The lower portion of the plate joins on to the left of the upper, the column marked A being represented in each. The two together give an enlarged view of the eastern portion (right-hand half) of the village of Kasa-an, Plate I. In the large house in the upper view, to the left of the canoe on the beach, is the body of Chief Skowl lying in state (1887), as pictured in Plate LXVII. The two carved columns in the lower right-hand corner (Fig. 1) are enlarged views of two commemorative mortuary columns shown in the general view. The nature and object of these are explained in the text.



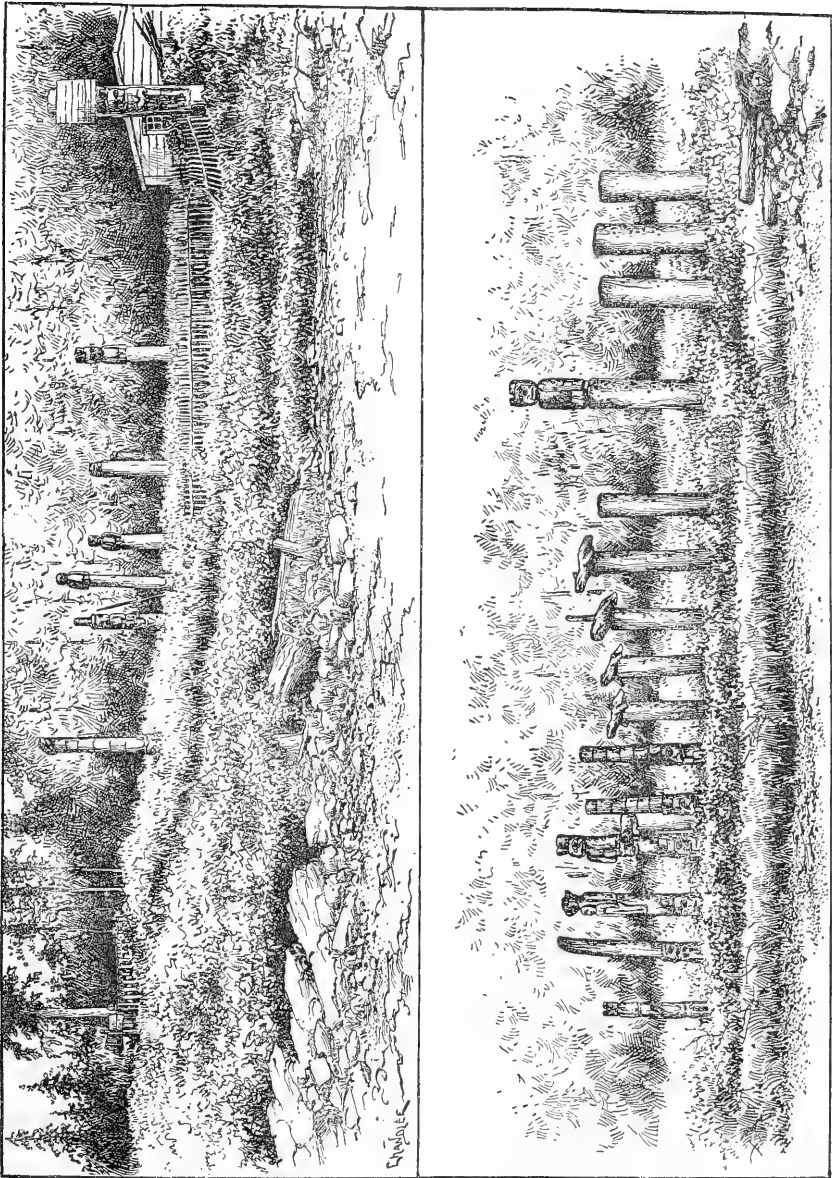
VIEW OF THE EASTERN PART OF KASA-AN VILLAGE, PRINCE OF WALES ISLAND, ALASKA.

EXPLANATION OF PLATE III.

VIEW OF THE WESTERN PART OF KASA-AN VILLAGE, PRINCE OF WALES ISLAND, ALASKA.

From photographs by the author.

The lower view is the extreme left of Plate I enlarged, and joins on to the left of the upper view. Both together represent the grave-yard of the village of Kasa-an.



VIEW OF THE WESTERN PART OF KASA-AN VILLAGE, PRINCE OF WALES ISLAND, ALASKA.

The habit of plucking the hair from the face and body obtains among the younger men, but the older ones suffer it to grow and wear a scanty beard and mustache, never however attaining any considerable length. Amongst the latter, also, long years of service in canoes has impaired their powers of locomotion and misshapen their legs, rendering them decidedly awkward on shore. This, by comparison, gives the body a long and large appearance. The head appears unusually large, due both to a real disproportion and to the mass of bushy hair and the high cheek-bones of the men. Their noses are less flat and fleshy than those of the Indians to the south. The teeth are white and fine, but in old age are much discolored and worn. The wearing down of the teeth comes from eating dried salmon on which sand and grit have been blown during the process of drying. The hands and feet are small and well shaped, especially amongst the women. As they all go barefooted a greater part of the year, their feet are callous, excoriated, and wrinkled by exposure. The women are comely and fine looking in youth and in early bloom usually have rosy cheeks. In complexion both sexes are surprisingly light colored. This is in no way due to intermixture with whites. Dixon (1787) says that they were "very little darker than the Europeans in general.* Langsdorff makes the same statement.† The Haida are markedly fairer skinned than the others, but still the dark tinge is quite apparent, and exposure always adds to it.

The habit of frequent bathing in both winter and summer hardens their physique. As soon as a child is able to leave its cradle it is bathed in the ocean every day without regard to season, and this custom is kept up by both sexes through life. This, with scant wrappings, kills off the sickly children, and hardens the survivors.‡ The scanty clothing worn by the men, their reckless exposure in all kinds of weather, and their ignorance of hygienic laws of ventilation and sanitation in their dwellings, bring in their train a long series of ills.

They are not particularly long-lived, although grey-haired people are not uncommon. Rheumatism and pulmonary diseases are their worst ills. Small-pox has ravaged the coast terribly. First introduced amongst the Tlingit by the Spaniards in 1775,§ it worked its way down the coast, breaking out from time to time in later years, depopulating villages and proving a fatal scourge to the natives of this region. No one thing contributed more to dishearten and subjugate these Indians than the ravages made by this fell disease.

Weak eyes and blindness are due to exposure and to the smoke of camp and household fires. Debauchery by bad alcohol, worse whisky, and the native "hoochinoo" has added its quota to the physical misfortunes of the Indians, while venereal diseases are extremely destructive.

* Dixon, *Voyages*, p. 238.

† Langsdorff, *Voyages*, Part II, p. 112.

‡ Langsdorff, *Voyages*, Part II., pp. 112, 113, and 135.

§ Portlock, *Voyage* (1787), p. 271.

Their habits of life are quite regular, and, when undisturbed by war, they carry on a definite routine throughout the different seasons, collecting food, furs and raw materials at one season to serve them for the next.

EMOTIONAL CHARACTERISTICS.

They are self-possessed, dignified and reserved, although much less taciturn than the hunting Indians of the western plains and the interior. They have the usual Indian stoicism under suffering, and bear extremes of cold, heat, hunger, and exposure with fortitude. They are quite venturesome, going well out to sea in their canoes. The Kaigani go out to Forrester's Island for birds' eggs every spring, 20 miles off the coast. Dixon (1787) states that he sighted a Haida canoe 8 miles out at sea, and, though caught in a fog, it reached land in safety, as he afterwards met the same party close in shore.* They often make trips of hundreds of miles in their canoes along the coast and interior waters, although in early days this was not so feasible, owing to the warlike relations of the different tribes. They are fond of parade and display, and are scrupulous observers of ceremony and etiquette. Many of their deadly feuds originate from trifling causes based on breaches of etiquette or custom. Dancing and singing are a part of their ceremonies of welcome, trade, and war, and to the early voyagers to this region the Indians seemed entirely given over to these exercises. Their narratives express generally the impression that these natives were aggravatingly and immoderately fond of dancing, because they could not trade with them until they had finished singing and feasting. They are equally fond of long speeches and addresses—it all being intended to impress the observer with the rank, importance, and influence of the individual who provides the entertainment. They are also great sticklers for justice and for custom. When smarting under the sense of a real injury or imaginary wrong they are cruelly and unreasonably revengeful, although ordinarily friendly. They impressed the early voyagers as being somewhat hospitable and generous, although this was largely, as now, founded upon the expectation of an equivalent return.

Their bravery is relative. If stronger than an opponent, their warlike demonstrations are quite pronounced, but in the presence of a superior force they are inclined to be submissive and peaceful, although ready to take an underhand advantage. Ambush, surprise, and superior numbers are the favorable conditions of coast Indian warfare, and no mercy is shown to women and children, except perhaps to make slaves of them or to hold them for a ransom. While slavery was practiced, before its abolition by our Government in 1867, slaves were treated with cruelty.

It is the universal testimony, as voiced by Portlock (1787), that "they treat their wives and children with much affection and tenderness."†

* Dixon, *Voyage*, p. 211.

† Portlock, *Voyages*, p. 290.

In the approach to political and industrial equality of the sexes, and in the respect shown for the opinions of their females, these Indians furnish another refutation of the old misconception concerning the systematic mal-treatment of the women by savages. Such a thing is incompatible with the laws of nature. Good treatment of the female is essential to the preservation of the species, and it will be found that this ill-treatment is more apparent than real.

By nature they are rather indolent, but their love of the power and the display incident to wealth has changed their disposition since 1775, so that they have become more enterprising. Originally the chiefs conducted the trade of the tribe, but in time the natural abilities of the other sex in driving bargains has resulted in the predominance of the influence of the women in such matters.

They endeavor to impress others with their importance, wealth, and powers, but are guarded in their expressions of wonder, surprise, or enjoyment at what they see elsewhere. They have come now to rely upon European medicines in sickness. When through carelessness, recklessness, and ignorance of the laws of health they come to grief, they incontinently dose themselves with all sorts of patent medicines which they buy from the traders.

Missionaries have been comparatively successful amongst them, the Greek and Presbyterian Churches having made considerable progress with them. The opportunities for long addresses, prayers, experience meetings, and singing in some of the Protestant forms of worship appeal strongly to native predilections, the influence of the Greek Church being principally about Sitka. The missionaries, however, discourage their dancing, and have influenced them in many localities to cut down the totemic columns and abandon cremation for inhumation-at-length as practiced by the whites.

INTELLECTUAL CHARACTERISTICS.

One sees many strikingly intelligent and attractive faces amongst the older men and women, where experience has given decided character to their expressions. The stolid, imperturbable moodiness attributed to the Indians of the interior here gives place to a more alert expression of countenance. They acquire knowledge readily, and the children at school make fair progress. They are quite ingenious, and especially handy with tools, picking up a trade with surprising readiness, and turning their hands to almost any sort of business. They are quite imitative and progressive, but have shown good sense and conservatism in retaining many native implements and methods where better adapted to their needs. They have a keen appreciation of the value of money, work for wages, and have considerable business judgment. It would seem that, with their ideas of acquiring wealth, we have little to teach them in habits of thrift. Of necessity, they have a good knowledge of the topography and hydrography of their region,

and of the habits and best modes of capture of all sorts of marine animals. On shore they are rather disappointing as hunters, as they are not at all cool headed. Their superstitions, beliefs, and practices of witchcraft, sorcery, slavery, and shamamism do not necessarily place them on a very degraded intellectual plane when we compare their practices and beliefs with those of other savage tribes.

They possess a fair knowledge of human nature ; have good oratorical powers ; are communicative when diplomatically approached ; have a keen sense and appreciation of the grotesque ; and have a great sense of wit and humor, as they laugh immoderately at the antics of the dancers, the witty remarks of the clowns, and the grotesque carvings erected in ridicule of the whites or of their neighbors. Placing implicit confidence in the truth of their legends and the reliability of their carved columns, they have an immense respect for graphic characters. Anything written on paper or carved is *per se* credible, and they attach the greatest value to a letter of recommendation written by a white man, irrespective of the sentiments expressed by the writer.

MORAL CHARACTERISTICS.

Judged by our standard, these Indians of the north have fallen by the way side. Judged by their primitive ethical conceptions, as compared with those of the surrounding tribes when they first came in contact with the whites, they may be said to be distinguished by the great progress they had themselves made in morals. When first visited by the early voyagers these Indians, like all others on the coast, were bold, arrant thieves. With them it was not dishonorable to steal, and, if caught, restitution settled the matter. On the other hand, they discriminated, and seldom or never stole from a guest, and never robbed one of their own totem. With them, to-day, an unwatched camp or an unlocked house is sacredly respected, and the most valuable property cached in the woods, as is the Indian custom, is as safe from other Indians as if guarded night and day. Unfortunately, white men have set some very bad examples in this respect, and the Indians have been more often sinned against than sinning.

They have great respect for the aged, whose advice in most matters has great weight. Some of the older women, even bond women in former times, attain great influence in the tribe as soothsayers, due as much to their venerable appearance as to any pretense they may make of working medicine charms. They are remarkably fond of and indulgent to their children, rarely chastising them. As between the sexes, the rights of the women are respected and the terms of equality on which the men and women live are very striking to most visitors of this region. Although marriage is essentially by purchase, and the question of morality and immorality of the wife solely one of sanction by the husband, yet even this restriction is centuries in advance of their northern neighbors, the Aleuts and Koniagas, with whom promiscuity

and the most bestial practices obtain. Early voyagers invariably mention the modest, reserved, and decorous bearing of the Tlingit, Haida, and Tsimshian women. Unfortunately, in recent years, the purchase of women and the practice of sanctioned prostitution have, under the spur of artificial needs of finery and luxuries, had a most demoralizing effect on them, and, with the rum question, are the serious problem which confronts the friend of the Indian. In their inveterate addiction to gambling and their craving for tobacco and alcohol they possess simply the vices incident to savagism. In their disregard for the lives and feelings of slaves, and in their practices of compounding murder and other crimes by the payment of indemnity to the relatives of the injured, we see simply the operations of custom, which with them has the force of law. Murder, seduction, wounds, accidental killing, loss of articles belonging to another, refusal to marry a widow according to law, *casus belli* in general, any wrong may be righted by payment of an indemnity in the currency of the region.

Sir James Douglas, Governor of the Hudson Bay Company about 1840, says :

If unmarried women prove frail, the partner of their guilt, if discovered, is bound to make reparation to the parents, soothing their wounded honor with handsome presents. A failure to do this would cause the friends of the offending fair one to use force to back up their demands and to revenge the insult. It must not, however, be supposed they would be induced to act this part from any sense of reflected shame, or from a desire of discouraging vice by making a severe example of the vicious, or that the girl herself has any visitings of remorse, or that the parents think her a bit the worse for the accident, or her character in any way blemished. Such are not their feelings, for the offender is simply regarded as a robber who has committed depredations on their merchandise, their only anxiety being to make the damages exacted as heavy as possible.*

Petroff illustrates as follows the curious custom of paying for injuries:

Wars are frequently avoided by an indemnity arrangement, and they go so far in this system of compensation that they demand payment for losses from parties who have been in no way instrumental in causing them. For instance, an Indian at Sitka broke into the room of two miners in their absence, emptied a demijohn of liquor, and died in consequence, and the relatives of the robber demanded and received payment from the unfortunate Caucasians. If a man be attacked by a savage dog and kills him in self-defense, he must pay for the dog to the Tlingit owner. A small trading schooner, while running before a furious gale, rescued two Tlingit from a sinking canoe, which had been carried to sea. The canoe was nearly as long as the schooner and could not be carried or towed, seeing which, the natives themselves cut the worthless craft adrift. When the humane captain landed the rescued men at their village he was astonished by a peremptory demand for payment for the canoe, backed by threats of retaliation or vengeance.*

To such an extent was this question of indemnity carried, that when the Russians at Sitka tried to interfere with the killing of slaves on ceremonial occasions, they were only successful in preventing it by ran-

*Quoted in Petroff's Report, p. 177.

* Petroff Report, p. 165.

soming the proposed victims. A narration of the exactions of the Indians for damages on account of the accidental deaths of relatives in the employ of whites would fill a chapter.

ÆSTHETIC CHARACTERS.

These Indians are exceedingly fond of singing and dancing; have considerable artistic taste in the use of colors; are advanced in the arts of carving; and have fair abilities in drawing and designing—all of which will appear in subsequent chapters. Their carvings in slate show the height to which their art rises, and would seem to easily place them at the head of the savage tribes of the world, especially when taken in conjunction with their industrial development. They bathe frequently in the sea, but on the other hand continually daub their faces, bodies, and heads with grease and paint, although this latter fashion is now dying out and has almost disappeared, except as an occasional custom. They were formerly indifferent to the stench of decayed animal and vegetable matter about their houses and villages, but the influence of the whites has wonderfully improved them in this respect. They are still, however, indifferent to all sanitary laws of ventilation, and their fondness for putrid salmon noses and herring roe is very trying, while the smell of rancid grease destroys the æsthetic value of many otherwise interesting curios from the region. A visit to an Indian house is to the uninitiated still somewhat of an ordeal, although nothing to what it formerly was. Through living in such intimate relations in the houses, there is an absence of a becoming sense of modesty in family life, although the offenses are chiefly to be laid at the door of the men, who in the summer months go almost naked, whereas the women dress very much the same in all seasons.

GENERAL CONSIDERATIONS.

Contact with the whites has staggered and arrested these Indians in their development. They are now adjusting themselves to a new mode of life. Although much reduced in numbers, they are far from being near extermination. Much is to be hoped for in the recent establishment of industrial and other schools and in the general interest now taken in the Indians. In the prohibition and prevention of the sale of liquor to them a great step has been taken. Much more needs to be done in the suppression of prostitution, in the recognition of Indian rights to hunting and fishing grounds, and in medical assistance to a people childishly ignorant of the simplest laws of health. Their Indian doctors are fast disappearing, and with them much of the degrading superstition of an ethnical group capable of almost any rise in the scale of civilization.

III.

REGULATIVE ORGANIZATION: CONSANGUINEAL—POLITICAL—INDUSTRIAL.

Government does not begin in the ascendancy of chieftains through prowess in war, but in the slow specialization of executive functions from communal associations based on kinship. * * * Evolution in society has not been from militancy to industrialism, but from organization based on kinship to organization based on property, and alongside of the specializations of the industries of peace the arts of war have been specialized.*

GENERAL CONSIDERATIONS.

On the northwest coast totemism permeates the whole tribal organization. The ceremonies at birth, initiation, naming, matrimony, feasting, dancing, funerals, and all other social occasions, all have for their object, in some way, the identification of the individual with his totem under its specific name. A totem is simply an organization of consanguineal kindred into a recognized group or band, but with its definition and practical workings we have more to do later.

Amongst the Tlingit, Haida, and Tsimshian, the organization is based on mother-right; that is, birth-rights, such as rank, wealth, property, etc., are received from the mother. Amongst the southern tribes of British Columbia father-right is the form of social organization. In the lowest and rudest forms of primitive human society we have simply the recognition of the maternity of a child, the paternity either not being known, or not considered. Matriarchy, this tracing of descent in the female line only, "mother rule," finds its most primitive form in the tribal organization of some of the Australians, where the tribe and child recognize a group of mothers (a sub-phratry), their issues, as it were, being pooled. The evolution of patriarchy, the recognition of definite male descent, "father-rule," is obscure, but its most primitive form is also found amongst some Australian tribes, where a group of fathers belonging to a sub-phratry have the monopoly of privileges with the women of a corresponding female sub-phratry, although the tribes may be a thousand miles apart and speak different languages.† As we advance from matriarchy towards patriarchy, we find, at the boundary, tribes wavering between female and male descent, or in which

* Maj. J. W. Powell. An. Rep., Bureau of Ethnology, I, p. 82.

† Frazer, Totemism, p. 67.

the male and female line have equal rights, but everywhere mother rule seems to have preceded father rule. "The couvade or custom in accordance with which the husband takes to his bed and is treated as an invalid when his wife has given birth to a child is perhaps a fiction, intended to transfer to the father those rights over the children which under the previous system of mother-kin, had been enjoyed by the mother alone."* In the evolution of social organization, therefore, matriarchy naturally precedes patriarchy. In the recognition of paternity and in the accumulation and inheritance of property from both father and mother, or either, we find the beginnings of patriarchy and of the evolution from "organization based on kinship to organization based on property." The recognition of property may be in itself the first step in this evolution. With the development of the institution of marriage, man's position in the community becomes fixed by kinship. In the segregation of blood relatives, based on either matriarchy or patriarchy, we get the household. In the organization of consanguineal kindred, we have the basis of the communal organization. In this stage, "There is no place in a tribe for any person whose kinship is not fixed, and only those persons can be adopted into the tribe who are adopted into some family with artificial kinship specified. The fabric of Indian society is a complex tissue of kinship. The warp is made of streams of kindship blood, and the woof of marriage ties."†

What has here been briefly said with regard to the origin and development of the patriarchal form of social organization from the matriarchal is peculiarly pertinent to a study and comparison of the ethnical affinities of the tribes of the northwest coast. The southern tribes have very few of the customs and traditions peculiar to the northern, and their social organization is different, "mother-rule" being peculiar to the northern group and "father-rule" to the southern. Dr. Franz Boas says:

On account of philological considerations, I think that the social organization of the Kwakiutl was originally patriarchal, or it may be more correct to say that the male and female line had equal rights. This opinion is founded on the fact that even among the tribes among whom matriarchate prevails at present, the same terms are used for denoting relationship in the male and female lines.‡

No satisfactory inferences as to the influence of these various northwest coast tribes on one another in traditions, customs, and social organization can as yet be drawn in view of the meager data we have. There is no more promising field for sociological study than in this region. In the ceremonial institutions, in the elaborate dance paraphernalia, in the carved heraldic columns, in the wide variations in the mortuary customs, in all the practices of tribes of highly imaginative and inventive Indians, we have here similarities and differences so be-

*Frazer, Totemism, p. 78.

†Major Powell, in An. Rept., Bureau of Ethnology, I, p. 69.

‡Science, Vol. XII, No. 299, p. 195.

wildering, that it is difficult to trace the mutual influences of the different ethnic groups. In nothing, however, more than in the totemic organization do we recognize these differences.

TOTEMISM.

The organization of consanguineal kindred is variously called the totem, the clan, the totem clan, or the gens (plural, gentes). Frazer, in his work on Totemism, thus defines it :*

A totem is a class of material objects which a savage regards with superstitious respect, believing that there exists between him and every member of the class an intimate and altogether special relation. * * * The connection between a man and his totem is mutually beneficent ; the totem protects the man, and the man shows his respect for the totem in various ways, by not killing it if it be an animal, and not cutting or gathering it if it be a plant.

Considered in relation to men, totems are of at least three kinds : (1) The clan totem, common to a whole clan, and passing by inheritance from generation to generation ; (2) the sex totem * * * (3) The individual totem, belonging to a single individual and not passing to his descendants. * * *

The clan totem.—The clan totem is revered by a body of men and women who call themselves by the name of the totem, believe themselves to be of one blood, descendants of a common ancestor, and are bound together by common obligations to each other, and by a common faith in the totem. Totemism is thus both a religious and a social system. In its religious aspect it consists of the relations of mutual respect and protection between a man and his totem ; in its social aspect it consists of the relations of the clansmen to each other and to men of other clans. In the later history of totemism these two sides, the religious and the social, tend to part company. * * * On the whole, the evidence points strongly to the conclusion that the two sides were originally inseparable ; that, in other words, the further we go back the more we should find that the clansman regards himself and his totem as beings of the same species, and the less he distinguishes between conduct towards his totem and towards his fellow-clansmen.

Tribal Society.—These totems, clans, or gentes are sometimes organized into groups called phratries, the union of the latter forming the tribe or people. We have, therefore, (1) the household or family ; (2) the totem ; (3) the phratry ; and (4) the tribe.

On the northwest coast the household is not the unit of the totem or of the phratry, as more than one totem is represented in each ; the father belonging to one totem and the mother and children to another. Besides this, a brother and his wife may belong to the household, or a sister and her husband ; thus numerous totems may be represented under one roof.

The practice of totemism on the northwest coast has not yet received the thorough study it deserves. It remains for some organization, governmental or incorporated, to systematically collect the data necessary for a complete tabulation of the phratries and gentes of all the tribes, and an exposition of their mutual relations and significance. In connection with this, a study of the totemic carvings, legends, myths, and folk-lore, must be prosecuted. The lists of totems from time to time published have served so far to obscure rather than elucidate the sub-

* Totemism p. 1, *sq.*

ject, owing to the apparent want of agreement of any two writers. The tendency to generalize from a study of one tribe alone has added to the confusion. Thorough and systematic collection of data at each village can alone give a reliable groundwork for generalizations. This work must be undertaken soon, or it will prove either incomplete or too late altogether.

The exceedingly imperfect data given here will at least serve as a preliminary sketch of the tabulation.

CONSANGUINEAL ORGANIZATION.

Totems.—From their nature, totems are in a state of flux. Clans tend to become phratries split up into sub-phratries; sub-phratries decay and finally disappear. An individual distinguishes himself, becomes wealthy, and hence a leading man in the village. His totem, or indeed his individual crest or sub-totem, may have been an obscure one. As he rises, its importance in the tribe rises with him. Under his successor, the totem widens its numbers and influence, and finally eclipses other clan totems, which eventually melt away or are incorporated with it. In the course of time, either by the accession of other totems or else by its splitting up into sub-totems, it came finally to be ranked as a phratry, then a sub-phratry. In this evolution we see the sub-totem grow into a clan totem, then into a phratry or sub-phratry, when decay sets in, and it “melts into the vast reservoir of nature from which it sprang.”

On the northwest coast we see only a few of the stages in this evolution, but by a study of totemism as it exists in all parts of the world the curve of the rise and fall of totems has been so accurately plotted, that there will probably be found in this region no wide variations from the general system.

Tlingit.—Amongst the Tlingit two exogamous groups of gentes exist, that is, they are divided into two phratries. The individuals composing the gentes in one phratry can only marry individuals in any gentes of the other. These phratries are popularly called the Raven and the Wolf. Much confusion arises from the fact that in the Wolf phratry we have the Wolf totem, and in the Raven phratry the Raven totem. Frazer says of this:

Considering the prominent parts played in *Tlingit* mythology by the ancestors of the two phratries, and considering that the phratries are also names of clans, it seems probable that the Raven and Wolf were the two original clans of the *Tlingits*, which afterwards by sub-division became phratries*.

Through popular misapprehension the origin of these two phratries

*Frazer, *Totemism*, p. 62. This seems to be further borne out by the testimony of Lisiansky, *Voyag.*, p. 242, Sitka (1805). “The tribe of the wolf are called the *Coquebans*, and have many privileges over the other tribes. They are considered the best warriors, and are said to be scarcely sensible to pain, and to have no fear of death. If in war a person of this tribe is taken prisoner he is always treated well and is generally set at liberty.”

is assigned to the tradition of the two mythical beings or heroes, *Tētl* and *Kanuk*, whose struggles, valor, and beneficence endowed the Tlingit with the good things of life. In his frequent transformations *Tētl* often adopted the form of the raven, giving to the Raven phratry the apparent right to claim descent from the great *Tētl*. Some authorities claim to identify *Kanuk*, the other godlike personage with the progenitor of the Wolf phratry; but Dr. Franz Boas claims through his interpretations of the Tlingit legends that "this *Kanuk* is identical with the eagle,"* and also that the Tlingit use the title Eagle and Wolf without discrimination in designating the so-called Wolf phratry. May not this be due to a possible amalgamation of the Wolf and the Eagle totem at a remote period ante-dating the growth of the totem into a phratry. This amalgamation takes place in the course of time in all Indian communities having a totemic organization. The partial list of Tlingit totems as verified by the writer is as follows:

Phratries.	
Wolf or Eagle.	Raven.
Totems.	
Wolf.	Raven.
Bear.	Frog.
Eagle.	Goose.
Whale.	Beaver.
Shark.	Owl.
Porpoise.	Sea-lion.
Puffin.	Salmon.
Orca.	Dog-fish.
Orca-bear.†	Crow.

The above totems are divided into sub-totems with special names denoting locality and collateral relationship. The vocabulary of titles, sub-titles, etc., is a large one, and needs in itself special study. The data has not yet been collected to enable us to give an adequate idea of the complexity and ramifications of the Tlingit totemic organization.

Kaigani.—The principal totems are the Crow, Raven, Brown Bear, Beaver, Eagle, Wolf, and Whale. In addition are also found the Seal, Orca (Killer), Gull, Crane, Frog, Shark, and others. Boas adds the Sparrow-hawk, Codfish, and Skate. The two exogamous groups or phratries amongst the Kaigani are the Wolf and the Eagle, according to Boas, designated as the *Is'at'ā'nas* and *Tak'tl ā'nas*. The division of

* Notes on Ethnology of British Columbia, before Am. Philos. Society, November 18, 1887, p. 422.

†At Fort Wrangell several households of the Orca and Bear totems have been amalgamated into one called by a different name from either, viz, *Nānā'ri*.

the above named totems into the two groups is not known definitely enough by the writer to warrant giving the list. Enough is known however to illustrate several anomalous groupings. For instance, the Raven and Bear totems belong to the Eagle phratry, whilst amongst the Tlingit they belong to the opposite or Raven phratry. In consequence of this, when, for instance, a Kaigani of either of these totems goes to Fort Wrangell (Stikine) or Tongass (Tunghoash), he becomes a member of the opposite phratry, and can only marry in what, in his own village, would be his own phratry. This illustrates very forcibly that it is the gens or totem which counts. Once a Bear always a Bear; whereas the phratry is in one sense limited or local. The obligations attaching to a totem are not, therefore, confined to tribal or national limits, but extend throughout the whole region. In childhood a transfer can be made from one totem to another. Supposing a chief desires his son to succeed him and to belong to his own totem; the babe is transferred to his sister to suckle, and is figuratively adopted by her. In this way the son acquires the totemship of his father, and at an early age is taken back by his own mother to raise. Dawson cites these cases of transfer as often effected among the Haida to strengthen the totem of the father when its number has become reduced and there is danger not only of loss of prestige but of extinction. The ties of the totem or of the phratry are considered far stronger than those of blood-relationship. A man can not marry in his own totem whether within or without his own tribe, or his own phratry within his own tribe. There is nothing to prevent a man from marrying his first cousin, and much to prohibit his marriage to a most remote connection or an absolute stranger. The children always take the mother's totem amongst the Tlingit, Kaigani, Haida, and Tsimshian, unless transferred to the father's by a fiction. Thus "mother-rule," or matriarchy prevails. Wealth and chiefship descend in the female line in a most curious way, as explained hereafter in dealing with the subjects of chiefship and inheritance. Dawson, speaking of the intertribal relation of totems, says:

An Indian on arriving at a strange village where he may apprehend hostility would look for a house indicated by its carved post as belonging to his totem and make for it. The master of the house, coming out, may, if he likes, make a dance in honor of his visitor, but in any case protects him from all injury. In the same way, should an Indian be captured as a slave by some warlike expedition and brought into the village of his captors, it behooves any one of his totem, either man or woman, to present themselves to the captors, and, singing a certain sacred song, offer to redeem the captive. Blankets and other property are given for this purpose. Should the slave be given up, the redeemer sends him back to his tribe and the relatives pay the redeemer for what he has expended. Should the captors refuse to give up the slave for the property offered, it is considered rather disgraceful to them. This, at least, is the custom pursued in regard to captives included in the same totem system as themselves by the Tsimshians, and it is doubtless identical or very similar among the Haidas, though no special information on this subject was obtained from them.*

* Dawson, Report, B, p. 134.

This is also the custom amongst the Tlingit and Kaigani. Langsdorff (1805) cites the custom about Sitka, and says that the ransom was usually paid in sea-otter skins.*

Haida.—Dawson states that—

A single system of totems (*Haida*, *Kwalla*) extends throughout the different tribes of the Haidas, Kaiganis, Tsimshians, and neighboring peoples. * * * The totems found among these peoples are designated as the *eagle*, *wolf*, *crow*, *black bear*, and *fin-whale* (or *killer*). The two last named are united, so that but four clans are counted in all. The Haida names for these are, in order, *koot*, *koo-ji*, *kit-si-naxa* and *sxa-nu-xā*. The members of the different totems are generally pretty equally distributed in each tribe. Those of the same totem are all counted, as it were, of one family, and the chief bearing of the system appears to be on marriage.†

According to Boas, the Haida are divided into numerous totems and into the two phratries, Eagle and Raven, the same as the Kaigani.‡

In the absence of any other information the subject must rest in this unsatisfactory condition.

Tsimshian.—Amongst the Tsimshian there are four gentes or totems, the Raven, the Eagle, the Bear, and the Wolf. A person of any totem may marry into any other than his own indifferently. In the strict sense, therefore, there are no phratries amongst the Tsimshian. Boas states that the totems of the Kwakiutl are the Raven, Eagle, and Bear, and that he believes that the Tsimshian have in general modified the customs of northern Kwakiutl.§

Origin of Totemism.—Some idea has been given of the systems of totems amongst the northern tribes of the northwest coast. Its practical workings will be given later on, in treating of the habits, customs, and traditions of these tribes. It may, in one sense, be out of place here to deal with the theory of totemism in a work of this nature, but something may be added to the general fund of speculation. No satisfactory theory has yet been advanced in explanation of the origin of totemism. Mr. Herbert Spencer finds it (1) in the primitive custom of naming children after natural objects from some accidental circumstance or fanciful resemblance or in nicknaming later in life; (2) the confounding of or misinterpretation of such metaphorical names or nicknames with the real objects, that is, confusing these objects with their ancestors of the same name, and reverencing them as they already revered their ancestors. Sir John Lubbock takes his stand on the "supposed resemblance" theory. Totemism can not be traced from ancestor worship directly, because it actually exists where there is the most unsatisfactory recognition of ancestry, that is of paternity or maternity, or even both. The confusion of natural objects with their known ancestors of the same names and reverencing them as they reverence such ancestors is in itself quite plausible enough, but the ex-

* Langsdorff, *Voyages*, part II, p. 130.

† Dawson, *Report*, p. 134, B.

‡ Correspondence, also *Science*, Oct. 26, 1888.

§ *Science*, Vol. XII, No. 299, p. 195.

istence of totemism where ancestry is vaguely or not at all recognized would seem in itself to call for some other solution.

Does not the theory of anthropolomorphism, the childish and natural philosophy of all phenomena, as suggested by Prof. O. T. Mason, account for totemism? Belief in the possibility of human descent from natural objects exists universally amongst primitive people. This has undoubtedly been strengthened by the credibility of the reality of experience in dreams, which, as a sequence, is followed by a belief in the possibility of sexual relations with objects of nature also founded on dreams. The existence of customs in Bengal, Servia, and Greece of marrying bride and groom to trees before marriage to each other is an illustration of the survival of such belief.*

Clearly, before we can have a recognition of ancestry, we must have a recognition of paternity; and a misinterpretation of names and confounding of ancestry with natural objects can not precede a belief in the possibility of sexual relations and descent from natural objects. It seems not unreasonable therefore to trace the origin of the belief last named to the well-known anthropolomorphism and credulity of savages in the reality of dreams. This is simply here suggested as a partial solution of the question.

POLITICAL ORGANIZATION.

Chiefs and Petty Chiefs.—In the sense in which the term is ordinarily used, there is no absolute chiefship. The family is the sociological unit. The head of that household in the village, which, through inheritance, wealth, numbers, and influence, predominates over the others, is nominally chief of the village. His authority is shadowy, and his power is largely due, aside from wealth, good birth, and family influence, to his prowess in war, or to personal and masterful qualities. Now and then, through various causes, a chief may rule a village with absolute or despotic sway, but the power is not so much due to headship, in itself, as to personal and aggressive qualities in the individual. Rank is principally dependent on wealth and good birth, although the latter in itself implies inheritance of rank and wealth. Personal qualities count for what they are worth in addition. General recognition and consensus of opinion settle the question of rank. That is to say, it is about what the individual can make it by all the arts of assertion, bargain, intrigue, wealth, display, and personal prowess.

Besides the principal chief, there are others, who are the heads of the other principal clan totems or households of the village. Their rank or claim to distinction and respect is relative to that of the chief in the degree of their wealth, age, superiority of natural understanding, the number of persons of which their household consists, and the general good fortune and prosperity of the group of persons of which they

* Frazer, Totemism, p. 34.

are the recognized head. Indeed, each household is in itself a subordinate government. The head of it, through heredity, wealth, ability, or otherwise, simply is recognized as a petty chief in the village. The head chief merely overshadows in the extent of his influence the petty chiefs. Often reverses of fortune turn the tables, and some decline in influence while others rise. Often the alliance of the medicine men is gained by purchase or by the sacrifice of private property, and the chiefs and shamans combine to uphold each other in the respect and fear of the community. Many bitter feuds grow out of the rivalries of households and gentes in the struggle for power and influence in the tribe. Often a man is strong enough, like Chief Skowl of Kasa-an, to crush out all opposition, or even, like Chief Skiddaus,* to extend his influence beyond his own village through the ownership of valuable lands, or through the necessities of war, and have his suzerainty recognized by the chiefs of other villages. In a strict sense, however, the village is the tribal unit. Alliances of tribes have always been only temporary, and no lasting federation has ever been formed. Simpson, who visited Alaska in 1841, says, of the rivalries of Chiefs Shakes and Qualkay, at Fort Wrangell (Stikine), "though Shakes was the principal chief, yet he had comparatively little influence; while the second ruler in the tribe (Qualkay) possessed a strong party in the village."†

A chief, as a rule, is not treated with any very marked deference on ordinary occasions excepting by his own household, but in ceremonies a degree of state was formerly kept up, to impress visitors or strangers with the importance and high rank of the dignitary. In the ceremonies at the conclusion of peace between the Russians and Indians at Sitka (1804), Lisiansky states that the Indian chief who acted as an ambassador was either borne by his slaves upon a mat-carpet or rug, or carried on the shoulders of his attendants, as become his rank, and not due to any infirmity of the chief, for in the ceremonial dances which followed he took a prominent part.‡

In early days the chief traded for all his tribe or household, subject however, to the approval of those present; but in recent years, with the abolition of slavery and the influence of the whites, the authority of the chiefs has been very much weakened. Instances are not rare where medicine men or shamans have been head chiefs of villages.

Freemen.—Below the chiefs come the freemen, who are the ordinary people of the tribe composing the different households. Above these in one sense, or above the petty chiefs for that matter, come the shamans or medicine men. This rank, however, is in no sense political. They are simply a class whose functions are largely religious.

Slaves.—On our acquisition of the territory of Alaska in 1867 the practice of slavery received its death-blow amongst the Indians. Pre-

* Poole, Queen Charlotte Islands, British Columbia, p. 108.

† Simpson, Journey Round the World, Vol. I, p. 212.

‡ Lisiansky, Voyages, p. 232.

viously to that the Russian authorities had sought to ameliorate, in some degree, the hardships of this wretched class in the vicinity of Sitka, but it was still in practice when we took possession. The slave class has now gradually been absorbed into the body of the freemen and slavery is a thing of the past.

Formerly wealth consisted largely in the possession of slaves. Simpson estimates that in 1841 one-third of the entire population of this region were slaves of the most helplessness and abject description. Though some of them were prisoners of war and their descendants, yet the great supply was obtained by trade with the southern Indians, in which the Tsimshian acted as middlemen. They were kidnapped or captured by the southern Indians from their own adjacent tribes and sold to the Tsimshian, who traded them to the northern Tlingit and interior Tinné tribes for furs. The last-named had no hereditary slaves, getting their supply from the coast. Dunn states (1834) that at Port Simpson, British Columbia, "A full-grown athletic slave, who is a good hunter, will fetch nine blankets, a gun, a quantity of powder and ball, a couple of dressed elk skins, tobacco, vermilion paint, a flat file, and other little articles."*

Slaves did all the drudgery; fished for their owner; strengthened his force in war; were not allowed to hold property or to marry; and when old and worthless were killed. The master's power was unlimited. If ordered by him to murder an enemy or rival, his own life paid the forfeit or penalty if he either refused or failed. The children of slave women by the master were slaves. In certain ceremonies it was customary to give several slaves their freedom; but at funerals of chiefs, or in ceremonies attending the erection of a house by a person of consequence, slaves were killed. Slaves sacrificed at funerals were chosen long before the death of their master and were supposed to be peculiarly fortunate, as their bodies attained the distinction of cremation, instead of being thrown into the sea. Simpson (1841) says of Chief Shakes at Wrangell (Stikine), that he was "said to be very cruel to his slaves, whom he frequently sacrificed in pure wantonness, in order to show how great a man he was. On the recent occasion of a house-warming, he exhibited as part of the festivities the butchery of five slaves; and at another time, having struck a white man in a fit of drunkenness and received a pair of black eyes for his pains, he ordered a slave to be shot, by way at once of satisfying his own wounded honor and apologizing to the person whom he had assaulted. His rival (Qualkay), on the contrary, was possessed of such kindness of heart, that on grand holidays he was more ready to emancipate his slaves than to destroy them; yet, strange to say, many bondmen used to run away from Qualkay, while none attempted to escape from Shakes; an anomaly which, however, was easily explained, inasmuch as the one would pardon the recaptured fugitives, and the other would torture and murder them."†

* Dunn, Oregon, p. 273.

† Simpson, Journey, Vol. 1, pp. 212, 213.

The practice of killing slaves in ceremonies and for reparation in quarrels was quite common among the northern tribes, and numerous instances might be cited. At Howkan, in one of the Indian houses, may be seen a couple of large wooden images each representing a wolf, with human face and real human hair on the head. This was to remind slaves that, if they escaped from their owners, they would become transformed into creatures like those depicted, half man, half wolf.

Poole (1863) says that the Haida, Chief Klue, informed him "that some years previously his brother-in-law, in those days the greatest chief on the coast, had been entrapped by the Fort Rupert Indians on his way home from Victoria and scalped and killed, with all his males, his females being divided as slaves among the victors."* This example is cited to show that it was very questionable if the northern Indians made very good slaves, being so warlike, and preferring, as they claim, death to slavery. On the other hand, the southern tribes were more docile, the Flatheads forming the principal part of the slave population of the northern Indians. In case of the liberation of a slave, he was adopted as a freeman into the clan to which his mother belonged either by birth or as a slave.

Civil Government.—There are no stated periods for councils or deliberative gatherings. A household consultation or a meeting of the gens or of the chiefs takes place under the spur of necessity. Women have usually as much to say as the men on other than ceremonial occasions, and their advice is frequently followed, particularly in affairs of trade. In matters affecting one or more gentes or the village, representatives of the various households or gentes meet more formally. They squat around or sit cross-legged, delivering formal speeches in turn, which are heard with rapt attention and approved of by grunts, murmurs, and uplifting of hands. In cases such as witchcraft or offenses of medicine men, sentence to death or to fine is adjudged by the leading men of the village after trial. Under most circumstances, however, the law of blood revenge, an "eye for an eye," leaves little need for other than family councils, as they are purely totemic offenses, and are arranged by the injured gens.

INDUSTRIAL ORGANIZATION.

Division of Labor.—As between the sexes, the women attend mostly to the common household duties, but the men have a fair share of the outside work about the house and camp. A chief is usually more or less waited on by his dependents. When slavery was in vogue, this class performed all the menial drudgery. The liberated slaves still occupy a somewhat dependent position. The men are the warriors and hunters, though an old woman of rank usually steers the war canoe. In ordinary transit the women assist the men in paddling, and the owner

*Poole, Queen Charlotte Islands, p. 235.

or the most experienced person steers. In the season of hunting fur-bearing animals, the women and children (and formerly slaves) take charge of the camps—fishing, drying fish, and gathering and drying berries for winter. Altogether the division of labor is upon equitable and economic principles, and the women by no means do all the drudgery. During the runs of salmon, herring, and eulachon, and in fact at all times during the summer season, special employment is dropped, and all the natives alike engage in the work in hand. In addition to the food supply, materials are collected to be worked up during the winter months, by those specially skilled, into various useful and ornamental objects. Different men and women acquire adeptness in different arts and industries, and devote their leisure to their trade. Some of the men are expert house-carpenters, canoe-builders, basket-makers, tanners of hides, hewers of wood, metal workers, carvers of wood, stone, horn, bone, slate, manufacturers of metal implements, ornaments, household utensils, etc., and are regularly paid for their services. This is especially true of the wood-carvers, who make and paint the totemic and mortuary columns. Others enjoy prestige as successful hunters of certain animals or expert fishermen. Some of the women are expert basket-makers, carvers of household utensils, weavers of cloaks and mats of cedar bark and wool, and makers of dance and ceremonial costumes. Generally the men are carvers and the women weavers. Dunn (1834) says of the Tsimshian, and it applies also to the Haida and Tlingit, "Every chief keeps an Indian on his establishment for making and repairing canoes and making masks for his religious representations; this man they call the carpenter."*

Portlock (1786) says of the Tlingit, "the women are the keepers of their treasures."† In fact, as before stated, the women are practically on an equality with the men in the industrial organization, and whether her advice in all matters is sought or not, she is quite apt to give it. Cases of "hen-pecked" husbands are not rare.

Inheritance.—In this totemic organization some singular features present themselves. Blood relationship is cut across in an arbitrary way, giving rise to peculiar customs and laws. As before stated, first cousins may marry, but totally unrelated persons in the same phratry may not. In a war between gentes or phratries, a groom, while celebrating his nuptials, may be called upon to fight his father-in-law on account of some trivial feud.

Property is inherited by the brother of the deceased, a sister's son, a sister, or the mother, in the order named, in the absence of the preceding. As a rule the wife gets nothing. She has her own dowry and personal property. Whoever inherits the property of the deceased, if a brother or sister's son, must either take the widow to wife, or pay an indemnity to her relatives in case of failure to do so. In case the heir is already married, the next in succession takes her; for instance, the

*Dunn, Oregon, p. 291.

†Portlock, Voyages, p. 290.

brother may inherit the property and the nephew get the relict. In case there is no male relative to marry her or in case an indemnity is paid, the widow may marry any other man. Sometimes an adopted child or the son adopted by a sister of the deceased may be the heir. The heir of Chief Skowl of Kasa-an (Kaigani) was his sister's son, Sahattan, who is now chief of the village. Should a boy be killed by accident, the indemnity is paid, by a reversal of this rule, to his mother's brother, the boy's uncle. Property inherited is taken possession of by the heir as soon as the body is burned or enclosed in the burial box. It becomes his duty within a year to give a great feast and erect a mortuary column in honor of the deceased. This ceremony is called glorifying or elevating the dead, and is one of the principal ones in this region.

Lisiansky (1805) says of the Tlingit about Sitka :

The right of succession is from uncle to nephew [meaning sister's son], the dignity of chief to yon excepted, which passes to him who is the most powerful, or has the greatest number of relations. Though the toyons have power over their subjects, it is a very limited power, unless when an individual of extraordinary ability starts up, who is sure to rule despotically, and, as elsewhere, to do much mischief. These toyons are numerous ; even in small settlements there are often four or five.*

SUMMARY.

The industrial organization is not different from the political, and most of the laws and customs which control them in their actions are founded on totemic laws, traditions, legends, folk-lore, and superstitions. For this reason the régulative organization, while not exactly weak, is at least not well differentiated. The actual function or occupation of the individual, both as a member of a household and of the tribe, is partially developed, although there are no real craft classes. Organization is based on kinship, and descent is in the female line. Totemism cuts across blood relationship and its chief bearing is on marriage. Most of the ceremonies have a bearing directly on totemism, and have for their object the identification of the individual with his totem.

*Lisiansky, *Voyages*, p. 243.

IV.

PERSONAL ADORNMENT: MUTILATIONS, LIP ORNAMENTS, TATTOOING, AND PAINTING. ORNAMENTS, NECKLACES, PENDANTS, AND BRACELETS. DRESS, ANCIENT, MODERN, RAIN, WAR, AND CEREMONIAL.

MUTILATIONS.

The practice of mutilation is older than recorded history. Man never has been satisfied with either his structure or appearance, and has constantly endeavored to improve upon both. On the northwest coast the mutilations are of the head and face, the practice of flattening or compressing the head being, however, peculiar only to the southern tribes of this region. Mackenzie, in his visit to the Bilqula, in 1793, described their heads as "wedge-shaped." This does not, however, obtain among the Haida, Tsimshian, and Tlingit, but they pierce the ear and the septum of the nose, and in addition the women slit the lower lip.

Lip, nose, and ear ornaments.—While amongst the Eskimo the men pierce the lip and wear the sleeve-button-shaped labrets of bone, shell, ivory, or stone, amongst the northern Indians the women alone wear the lip ornament. Between these two geographically are the Koniagas and Aleut. With the Koniagas both sexes pierce the septum of the nose and the under lip and wear ornaments in them.

Beginning with the Yakutat* and running as far south as the Kwakiutl,† we find the custom amongst the women of wearing a labret in a slit cut in the lower lip. It is symbolic of maturity, the incision first being made either in childhood or else at puberty. In either case it is done with some ceremony, which is described in Chapter XIII. A copper wire‡ or piece of shell or wood is introduced into the fresh incision to keep the wound open. The object inserted is gradually enlarged until an artificial opening of some size is made. When maturity is reached a block of wood is inserted. This is oval or elliptical in shape, and amongst the Haida and Tsimshian quite elongated. With the Tlingit, on the other hand, it is almost circular in shape. In general it is hollowed out on both sides, and grooved on the edge like the sheave

* Dall, Alaska, p. 428, and Bancroft, Vol. I, Native Races, both state that the Yakutat do not now wear the lip ornament. Dixon (1787), however, in Voyages, p. 172, minutely describes the custom as then in vogue amongst them.

† Simpson, Journey Round the World, p. 204, Vol. I. (1841).

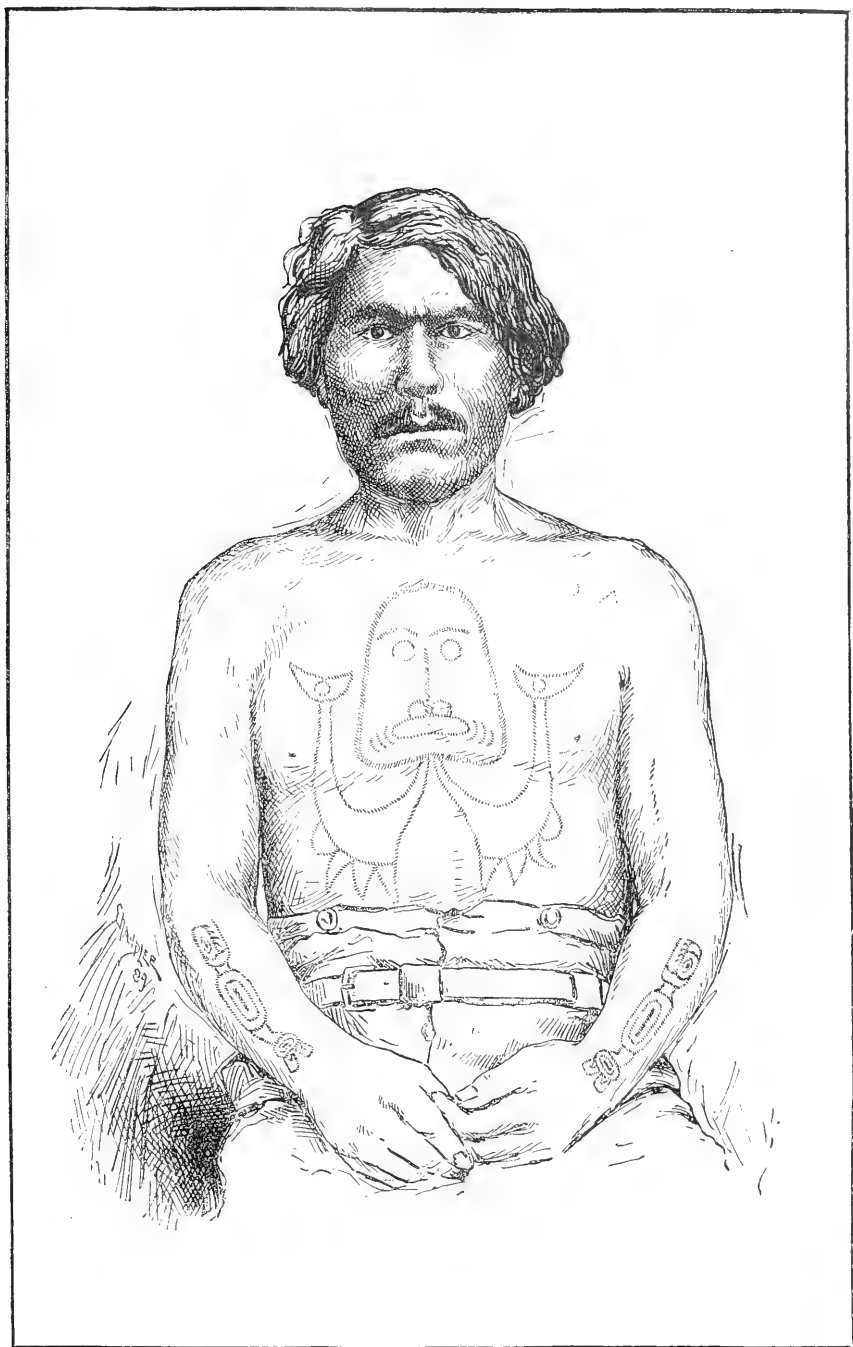
‡ Vancouver, Voyages, Vol. II, p. 408, states that the copper or brass "corrodes the lacerated parts, and by consuming the flesh gradually increases the orifice until it is sufficiently large to admit the wooden appendage."

EXPLANATION OF PLATE IV.

CHIEF KITKUN, OF THE HAIDA VILLAGE OF LAS KEEK, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

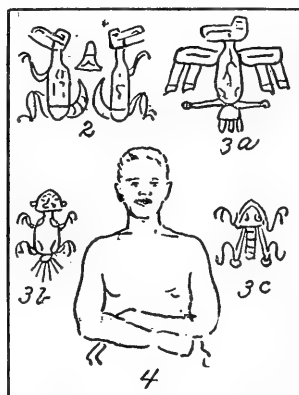
From a photograph in the U. S. National Museum.

Kitkun is here selected as a type of the Haida Indian. The rank which he held in 1873 was that of a petty chief of the village, his brother, Chief Klue, being the head chief. On the death of his brother, Kitkun became head chief of the village, assuming the hereditary title, Chief Klue. The tattoo mark on the breast represents Kahatla, the cod-fish, and that on his arms Cheena, the salmon. The design on his back is shown in Fig. 2, Plate V, and represents Wasko, a mythological being of the wolf species.



CHIEF KITKUN, OF THE HAIDA VILLAGE OF LAS KEEK, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

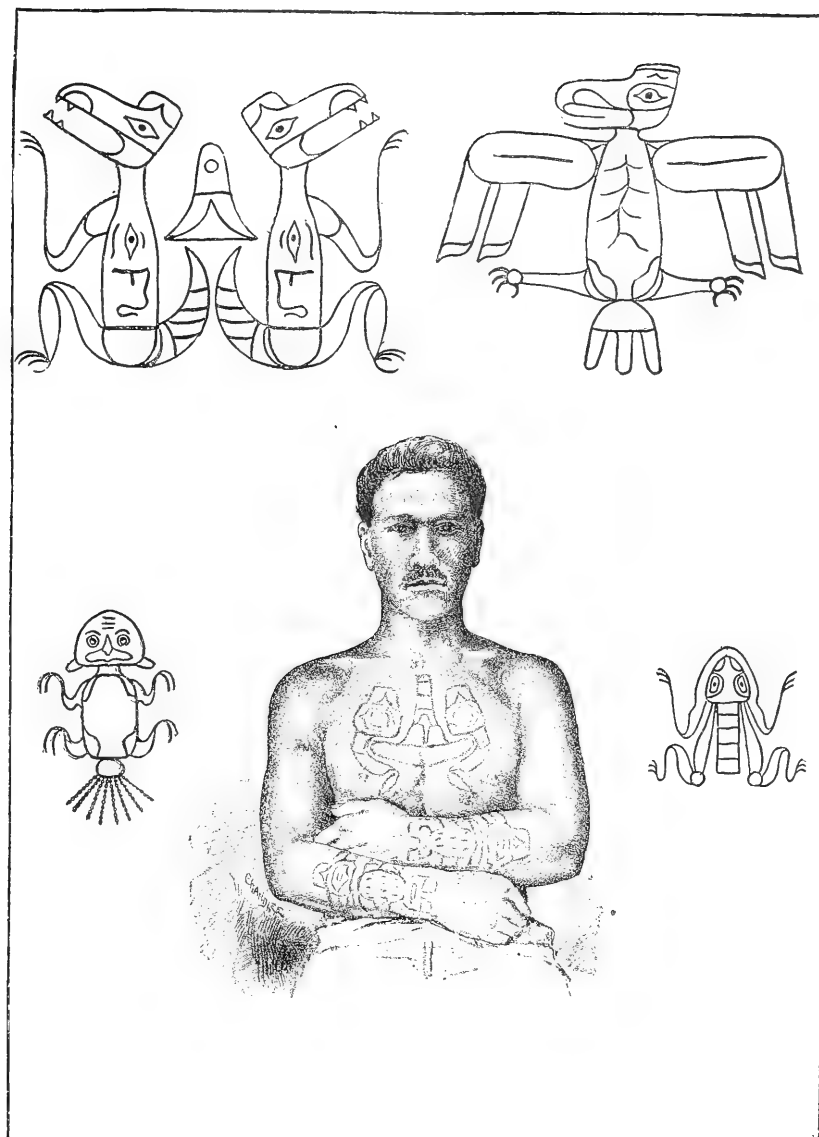
EXPLANATION OF PLATE V.



HAIDA TATTOOING.

From photographs by the author and sketches by James G. Swan, of Port Townsend, Washington.

- Fig. 2. Design copied from the back of Chief Kitkun, representing Wasko, a mythological being of the wolf species.
- Fig. 3a. Tattooed design on the back of the Haida (shown in Fig. 4) representing the Thunder-bird.
- Fig. 3b. Design on the leg of the Haida (shown in Fig. 4), half way between the knee and thigh, representing the squid octopus.
- Fig. 3c. Design on the skin of the Haida (shown in Fig. 4) just below the knee, representing Tlankostan, the frog.
- Fig. 4. Young Haida from Queen Charlotte Islands, British Columbia. The tattoo mark on the breast represents Hoorts, the bear, and that on his fore-arm Koot, the eagle.



HAIDA TATTOOING.

of a pulley to keep it in place. Each succeeding year a larger and larger lip-block is inserted, the effect being in old age to drag the lip down, exposing the discolored and worn teeth, and forming altogether, to the European, a disgusting spectacle, but to them a thing of beauty and a token of rank, maturity, and social position. In running, it flops up and down between the nose and chin in a very undignified manner. It is as embarrassing to an Indian woman to be seen without her labret as for a European woman to be seen with uncovered bosom.* Female slaves were invariably forbidden the privilege of wearing them. The size of the labret measures the social importance and wealth of the wearer. The custom is now dying out, but is still seen amongst the older Haida women, the labrets being principally made of wood. Formerly it was the custom to ornament them with copper and inlay them with haliotis shell by way of beautifying them. They varied in size from 4 inches long by 3 broad down to small buttons to wear in the first incision. Now that this custom is dying out, a form of it is seen in the piercing of the lip with a small hole and the insertion of a silver tube or bar (Plate xi).

Piercing the nose.—Both sexes pierce the septum of the nose and insert ornaments, originally of copper, bone, wood, or haliotis shell; but now of silver, such as rings or bars or tufts of red woolen yarn, with pendent shark's teeth. The Tlingit wear a silver or bone ring through the nose, as seen in several accompanying plates, but formerly the custom of wearing an ivory stick or pin obtained in some localities.

Piercing the ears.—Both sexes pierce the lobe of the ear and wear ornaments as in the nose. Around the rim of the ear additional holes are pierced. Men of rank have as many as five or six of these latter. Formerly, according to Dawson,† “these held little ornaments formed of plates of haliotis shell, backed with thin sheet copper or the small teeth of the fin-whale.” This custom is also fast dying out. Amongst the older men and women one still sees these practices, but in a modified and less pronounced form.

Tattooing.—This practice is found rarely among the Tlingit, if at all, and only occasionally amongst the Tsimshian, although it crops out here and there, in a very mild form, all along the coast. With the Haida alone, of all the Indian stocks, tattooing is a fine art, and is common to both sexes. The figures are conventional representations of their totems, pricked in charcoal, lignite, or black pigment, and serve to identify the individual with his or her totem. The men have these designs tattooed on their breasts, on their backs between their shoulders, on the front part of their legs below the thighs, on the shins below the knee, and on the back of the fore-arms. Occasionally the men also have these designs on the cheek and back of the hands, although rarely seen

* La Pérouse, Voyage, tom. II, p. 226,

† Dawson, Report, B, p. 109,

now.* The women tattoo the same as the men, excepting that the designs on the upper part of the leg are said to be omitted. The designs on their fore-arms invariably extend down over the back of the hands and knuckles, and this alone serves to distinguish the Haida women from those of other tribes on the coast. Plate IV shows the tattooing on *Kitkūn*, Chief of Laskeek, Queen Charlotte Islands, British Columbia. Plate V shows the details of tattooing, which subject will be found more thoroughly treated in a paper by Judge J. G. Swan, in the Fourth Annual Report of the Bureau of Ethnology, pp. 66-73. Fig. 2, Plate V, is the design on back of *Kitkūn*. Frequently the tattooing on the hands represents finger-rings and bracelets. A Haida woman who had on her person a figure of a halibut laid open, with the face of the chief of her tribe shown on the tail, told Poole that it would protect her and her kin from drowning at sea.† * * * Judge Swan says:

It should be borne in mind that, during these festivals and masquerade performances, the men are entirely naked, and the women have only a short skirt reaching from the waist to the knee; the rest of their persons are exposed, and it is at such times that the tattoo marks show with the best effect, and the rank and family connection are known by the variety of designs. Like all the other coast tribes, the Haidas are careful not to permit the intrusion of white persons or strangers to their Tomanawos ceremonies, and as a consequence but few white people, and certainly none of those who have ever written about these Indians, have been present at their opening ceremonies when the tattoo marks are shown. * * * As this tattooing is a mark of honor, it is generally done just prior to a Tomanawos performance, and at the time of raising the heraldic columns in front of the chief's houses. The tattooing is done in open lodge and is witnessed by the company assembled. Sometimes it takes several years before all the tattooing is done, but when completed and the body is well ornamented, then they are happy and can take their seats among the elders.

The design is carefully drawn in charcoal or lignite (ground in water) on the body and then pricked in with needles. It takes some time to finish a design, but once completed the status of the individual is fixed for life.

Painting the body.—From the Yakutat, throughout the region south, the custom obtains, on ceremonial occasions, of painting the face and body a variety of colors, and daubing the hair with red, black, or brown pigments. This custom is now becoming rare. On ceremonial occasions of importance the white down of eagles or other birds is powdered over the paint on the body and head, giving a polite coat of tar and feathers. In war various hideous and grotesque patterns were formerly adopted for the face, such as a circle of black with a red chin, giving to the wearer the appearance of having on a mask. The colors on the body are removed in lines by brushes or sticks in order to trace the pattern of the totem of the wearer, similar to the tattooing on the body. Amongst the Tlingit this in effect takes the place of tattooing;

* Seen by the writer at Kasa-an village (Kaigani) 1885. The practice of tattooing is dying out and only found among the older people.

† Poole, Queen Charlotte Islands, p. 311 [1864].

sometimes the designs are laid over the other paint with charcoal. Nowadays the paint is washed off after the ceremonies, but formerly it was the custom throughout the coast for the rich to renew the coat daily, while the poor would have to manage according to their abilities. Vancouver thus describes the war paint of the Nass, with whom he had a hostile encounter:

These had contrived so to dispose of the red, white, and black as to render the natural ugliness of their countenances more horribly hideous. This frightful appearance did not seem to be a new fashion among them, but to have been long adopted by their natural ferocious dispositions.*

Before the advent of looking-glasses the Indians made one another's toilets. A chief was served by his slaves or his wife. This custom of adorning the body with paint served other than æsthetic purposes. In war and ceremony it added to the effect on the observers; it identified the wearer with his totem, and finally served as a protection to the body against mosquitoes and the weather. This last named is the principal use to which the custom is now put, viz, of wearing a coat of black paint on the face and hands. This must be distinguished from the mourning paint made from charcoal. The other referred to is a brownish-black paint, now commonly worn to prevent the burning of the skin in hot weather from the glare of the sun on the water, and as a protection against mosquitoes and sand-flies. This coat consists of a soot, like burnt cork, made from a charred fungus, rubbed into the skin with grease. This gradually turns black and is frequently renewed.

In general the paints used were charcoal, charred and roasted fungus; white, red, and brown earths (ochres); lignite, vegetable juices; and powdered cinnabar.

Hair.—As mentioned, ochres and bird's down are used for dressing the hair for ceremonial occasions. Portlock says that among the Tlingit, this was only practiced by the men.† Ordinarily the hair is worn short by the men, excepting the shaman, and long by the women, who usually wear it done up in two plaits down the back, but sometimes in one plait, or "clubbed" behind and bound with red cloth. The earlier custom was somewhat different, according to Portlock (1787), who says: "The women wear their hair either clubbed behind or tied up in a bunch on the crown of the head; the men wear theirs either loose or tied at the crown."

The hair is dressed with combs of a somewhat conventional pattern, as illustrated in Figs. 11*c* and 11*d*, which are from two specimens in the Emmons Collection in the Museum of Natural History, New York. Figure 11*c* is made from a small, thin piece of bone, while 11*d* is carved

* Vancouver, Voyage, Vol. II, p. 337.

† Portlock, Voyage (1787), p. 290.

from cedar wood and ornamented with a totemic design. Figure 11e is a stone comb in this same collection.

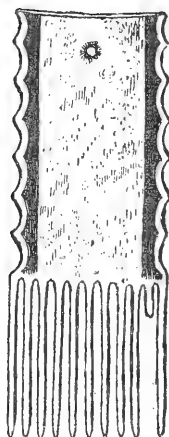


Fig. 11c.

BONE COMB.

(Tlingit. Emmons Collection.)

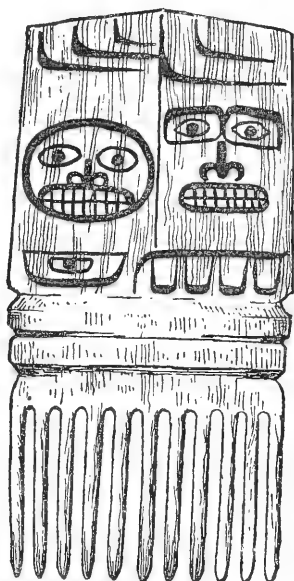


Fig. 11d.

WOODEN COMB.

(Tlingit. Emmons Collection.)

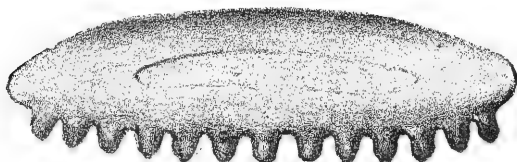


Fig. 11e.

STONE COMB.

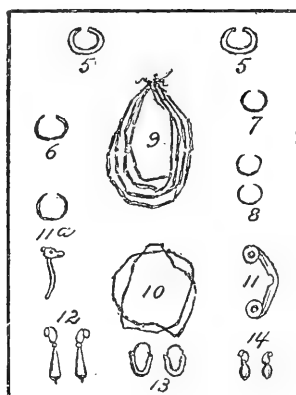
(Tlingit. Emmons Collection.)

ORNAMENTS.

With the practice of mutilations comes the adornment of the person with ornaments fashioned from a great variety of materials. It seems that, not content with the facilities offered naturally for securing these to the person, mutilations were often practiced solely to enable the wearer to attach ornaments to the ear, lip, nose, or cheek.

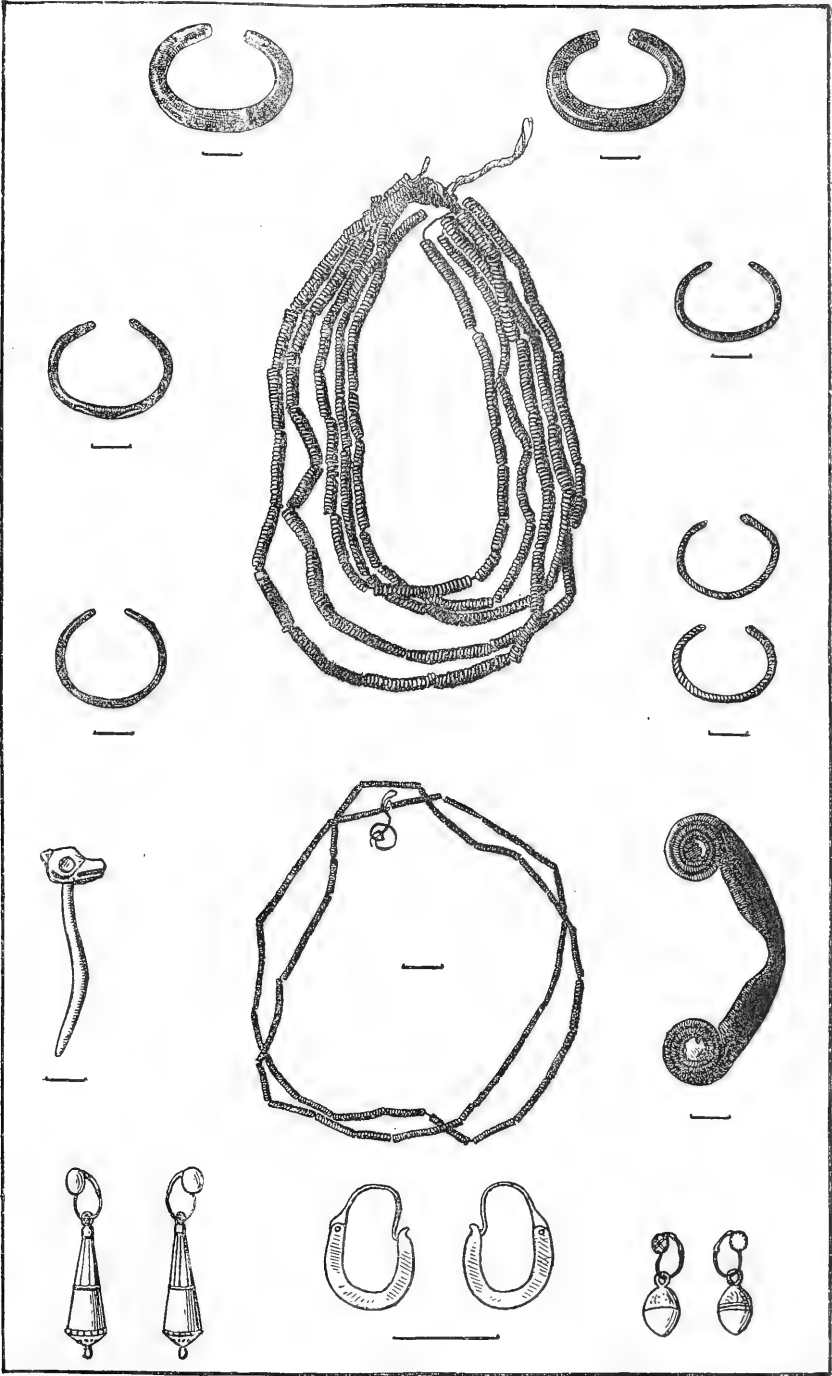
Labrets or lip ornaments.—These are made of stone, wood, bone, shell, ivory, silver or copper, sometimes of one material only, sometimes of a combination of several. In form they vary from a pulley-shaped disc to a collar button, and in size from 4 inches to a small cylinder of one-eighth inch in diameter. The labret shown in Plates XLIX and

EXPLANATION OF PLATE VI.



ANCIENT AND MODERN METAL ORNAMENTS FROM THE NORTHWEST COAST.

- Fig. 5. COPPER BRACELETS, same as those worn in Alaska. Cat. No. 20627, U. S. N. M. Kwaikutl Indians, Bella Bella, British Columbia. Collected by James G. Swan.
- Fig. 6. COPPER BRACELETS. Inlaid with shell. Cat. No. 19529, U. S. N. M. Tlingit Indians, Fort Wrangell, Alaska. Collected by James G. Swan.
- Fig. 7. COPPER BRACELET. Inlaid with shell. Cat. No. 20637, U. S. N. M. Tsimshian Indians, Fort Simpson, British Columbia. Collected by James G. Swan.
- Fig. 8. BRACELETS. Of twisted copper wire. Cat. No. 56468, U. S. N. M. Kwaikutl Indians, Fort Rupert, British Columbia. Collected by James G. Swan.
- Fig. 9. COPPER NECKLACE. Ancient form. Cat. No. 88715, U. S. N. M. Masset Indians (Haidan stock), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 10. NECKLACE. Of copper wire, ancient form. Cat. No. 88746, U. S. N. M. Masset Indians (Haidan stock), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 11. HAIR ORNAMENT (Tchenes). Of steel, highly polished, inlaid with haliotis shell. Ancient form, worn by young girls, and valued at one to two slaves. Cat. No. 10313, U. S. N. M. Tsimshian Indians, Nass River, British Columbia. Collected by Lieut. F. W. Ring, U. S. A.
- Fig. 11a. HAIR-PIN. Of iron inlaid with shell. Cat. No. 19528, U. S. N. M. Tlingit Indians, Fort Wrangell, Alaska. Collected by James G. Swan.
- Fig. 12. EAR-RINGS. Of silver, modern type. Cat. No. 19552, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by James G. Swan.
- Fig. 13. NOSE-RINGS. Of silver, modern type. Cat. No. 19551, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by James G. Swan.
- Fig. 14. EAR-RINGS. Of silver, modern type. Cat. No. 19550, U. S. N. M. Kaigani Indians (Haidan stock), Prince of Wales Island, Alaska. Collected by James G. Swan.

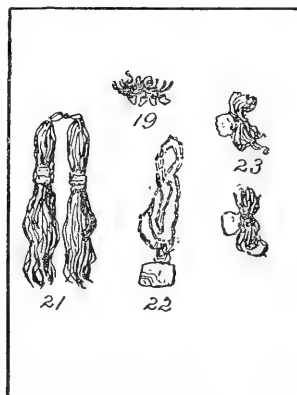


ANCIENT AND MODERN METAL ORNAMENTS FROM THE NORTHWEST COAST.





EXPLANATION OF PLATE VII.



BONE AND SHELL ORNAMENTS FROM THE NORTHWEST COAST.

- Fig. 19. EAR AND NOSE ORNAMENTS. Of shark's teeth. Cat. No. 72993, U. S. N. M. Auk Indians, Admiralty Island, Alaska. Collected by James G. Swan.
- Fig. 21. EAR PENDANTS. Of skeins of red worsted, ornamented with abalone shell. Cat. No. 88883, U. S. N. M. Masset Indians (Haidan stock), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 22. NECKLACE. Of dentalium shell with pendant of abalone. Cat. No. 88885, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 23. EAR PENDANTS. Of red worsted and abalone, the latter carved to show wearer's totem. Cat. No. 20674, U. S. N. M. Collected by James G. Swan.



BONE AND SHELL ORNAMENTS FROM THE NORTHWEST COAST.

in the figure of the "Bear Mother" is a good illustration of the size and appearance of this appendage as worn up to recent years.

Nose ornaments.—Fig. 13, Plate VI, is the general type of silver nose-rings in use around Dixon Entrance. It is often worn in this same shape made of bone. Another favorite ornament both for the nose and ear is the shark's tooth, as shown in Fig. 20, Plate VII. As such it is usually attached to the hole in the nose or lobe of the ear by a yarn of red worsted. Sometimes the red worsted is alone worn; sometimes a piece of bone triangular in shape replaces the shark's tooth which it is meant to imitate. A bone or ivory stick or cylinder was formerly worn. Fig. 17, Plate VII, is an illustration of a primitive bone nose ornament of a different type from any of these mentioned.

Ear ornaments.—Figs. 12 and 14 represent the common types of silver ear-rings now worn in the northern region around Dixon Entrance. As mentioned above, sharks' teeth and red worsted are favorite ear ornaments. These are illustrated in Figs. 20, 21, and 23, Plate VII. Fig. 12*a* is a Tlingit ear ornament of ivory from the Emmons Collection in the Museum of Natural History, New York. In its ornamentation and design it shows the effects of intercourse with the Aleut and Koniagas to the north. Fig. 12*b* is a pin or peg of ivory or bone of a type sometimes worn by the Tlingit and Haida.

Hair ornaments.—Fig. 11*a*, Plate VI, is an iron hair-pin from Fort Wrangell, Alaska (Tlingit.) It is inlaid with haliotis and highly polished. Fig.



Fig. 12*a*.

EAR ORNAMENT.

(Tlingit. Emmons Collection.)

11, Plate VI, is an iron "tchene" highly polished and inlaid with haliotis shell. It is worn by young girls as an ornament in the hair. This specimen is from the Nass Indians (Tsimshian), but they are also found amongst the Tlingit and Haida, and were formerly valued at from one to two slaves. Red is the favorite color for cloth or ribbon used by the women for dressing their hair, as described previously.

Necklaces.—Fig. 22, Plate VII, is a necklace of red beads and dentalium shell strung alternately and further ornamented with a square

piece of abalone shell pendent. This specimen is from Masset, British Columbia (Haida), as is also that shown in Fig. 9, Plate VI, which is made of twisted copper wire and is of a very primitive type. Fig. 10 is the same kind as that shown in Fig. 9, but it has been oxidized by the heat and looks somewhat like iron wire instead of copper.

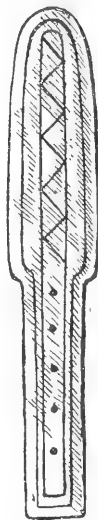


Fig. 12*b*.

EAR ORNAMENT.

(Tlingit and Haida. Emmons Collection.)

Finger-rings.—These were formerly made entirely of copper, bone, shell, or black slate, and were ornamented with totemic designs. Now silver has so generally displaced all other materials that the primitive types are rarely seen.

Bracelets.—Fig. 5, Plate VI, is a pair of copper bracelets from Bella Bella, British Columbia, (Kwakiutl) similar to those worn north. Fig. 6 represents a pair from Fort Wrangell, Alaska, also of copper, inlaid with haliotis shell. Fig. 7 is one similar in style to that shown in Fig. 6, from Fort Simpson, British Columbia (Tsimshian). Fig. 8 represents a very primitive type of copper bracelet of twisted copper wire, from Fort Rupert, British Columbia (Kwakiutl), but similar to those worn north. Fig. 16*b* is a Tlingit iron bracelet of native workman-

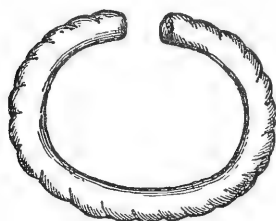


Fig. 16*b*.

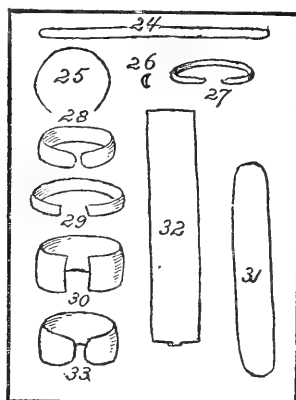
IRON BRACELET.
(Tlingit. Emmons Collection.)

ship, from the Emmons Collection. Plate VIII represents the types of silver bracelets worn on the northwest coast at the present day. They are made from silver coin, and have replaced those of bone, horn, copper, shell, and iron formerly worn. Fig. 24 represents the coin hammered out into a flat strip of the required width with ends rounded into shape. Fig. 25 represents the same bent nearly into shape by gentle hammering.

In its flat shape the silver has little or no elasticity or spring, so the next step is to round the bracelet out on the inside, as shown in cross-section, Fig. 26. This is done by means of a hammer and a blunt cold chisel. In the process of hammering the bracelet curls up more and more, and is beaten out thinner and broader. This economizes silver, and gives elasticity and clasp to the bracelet. The next step is to carve the design on it as shown in the finished bracelet, Fig. 27. On this width totemic designs are seldom carved, scroll work being used. The tools are of the most primitive kind, consisting of a hammer, blunt cold-chisels, and a sharp steel carving or etching tool. Figs. 28 and 30 represent a style of clasp somewhat in vogue, but Figs. 27 and 29 are the prevailing patterns. On the larger bracelets the totemic design of the wearer is usually carved. Fig. 31 represents the design on Fig. 29 rolled out, and Fig. 32 the same for Fig. 30. The former design represents the Bear, and the latter the Thunder Bird. Figs. 27, 28, and 29 are Tlingit, Fig. 30 Haida, but the same types are found amongst all the northern tribes; the Haida being the most expert silversmiths, as they are also in general the best carvers on the coast.

Dixon (1787) states that the Tlingit and Haida wore large circular wreaths of copper about the neck, evidently of native manufacture. With the introduction of iron by Europeans bracelets of iron wire somewhat took the place of the more expensive copper ones, to be in turn later succeeded by those of silver. The present custom is to wear

EXPLANATION OF PLATE VIII.



GENERAL MODERN TYPE OF HAIDA, TSIMSHIAN, AND TLINGIT SILVER BRACELETS.

Fig. 24. STRIP OF SILVER, hammered from a coin ; first step in making the bracelet represented in finished state in Fig. 27.

Fig. 25. SECOND STEP IN MAKING BRACELET.

Fig. 26. THIRD STEP IN MAKING BRACELET. Strip hammered to concave section.

Fig. 27. FINISHED BRACELET. Cat. No. 19539, U. S. N. M. Tlingit Indians, Alaska. Collected by James G. Swan.

Fig. 28. BRACELET. With clasp., Cat. No 49201, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.

Fig. 29. SPRING CLASP BRACELET. Cat. No. 19532, U. S. N. M. Tlingit Indians, Alaska. Collected by James G. Swan.

Fig. 30. BRACELET. Largest size. Cat. No. 20251, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.

Fig. 31. DESIGN ON BRACELET, Fig. 29. Thunder-bird or Eagle. Rolled out impression.

Fig. 32. DESIGN ON BRACELET, Fig. 30. Hoorts, the bear. Rolled out impression.



GENERAL MODERN TYPE OF HAIDA, TSIMSHIAN, AND TLINGIT SILVER BRACELETS.

bracelets and ear, nose, and finger rings of silver. The natives prefer silver to gold. Their fondness for red worsted as ear ornaments has also been alluded to, and is well illustrated in Plate VII.

DRESS.

Primitive clothing.—What early attracted the traders to this region was the character of the clothing worn by the natives, consisting of valuable furs roughly sewn together, seal and sea-otter being the most common and the most sought after. The costume of the men was scanty, consisting of an under coat, a cloak, and sometimes a breech clout, although the last named seemed to be a very unimportant and often omitted article of dress. Dixon (1787) describes their clothing as “made of such skins as fancy suggests, or their success in hunting furnished them with, and sometimes loose cloaks thrown over the shoulders and tied with small leather strings. * * * The dress of the women differs in some respects from that of the men. Their undergarment is made of fine tanned leather, and covers the body from the neck to the ankle, being tied in different parts to make it fit close. * * * The upper garment is made in much the same manner as the men’s coats, and generally of tanned leather, the women not caring to wear furs. * * * Over this is tied a piece of tanned leather like an apron, and which reaches no higher than the waist.”*

In other words, both sexes wore a cloak and an under garment or coat reaching to the waist. To this the men added a belt or breech piece, and the women a skirt or gown reaching to the calf or ankle. Both sexes went barefooted, although wearing, as now, in very cold weather, a kind of moccasin.

Sea-otter skins were a staple article of trade amongst the Indians themselves, and were stored in large quantities, being the basis of wealth and the unit of value. The eagerness of Europeans to trade for them led to the exhaustion of the stock on hand, the sacrifice of their clothing, the practical extinction of the sea-otter, the adoption by the Indians of European clothing, and substitution of other standards of value and wealth. Garments of fur are still worn in cold weather, the skins of the less valuable animals, such as the rabbit, squirrel, and goat being used. These skins are fastened together with cords of twisted linen or finely spun vegetable fibre. Figs. 21a and 21b represent two varieties of bone fids or awls for pricking the holes in the skins to enter the thread for sewing.

Ceremonial blanket—These northern Indians, particularly the Chilkat tribes (Tlingit), have possessed from time immemorial the art of weaving twisted bark thread and the wool of the mountain goat into blankets. These they value most highly, and persons of rank and



Figs. 21a, 21b.

BONE AWLS.

(Tlingit. Emmons Collection.)

* Dixon, Voyage, p. 239.

wealth wear them only on extraordinary occasions. They are commonly called Chilkat blankets, and form heir-looms in every wealthy family. One of these is pictured in Plate x, Fig. 33. To-day they are worth from \$25 to \$40 each. Dawson states that the Haida obtain them from the Tsimshian. The warp consists of twine of finely shredded cedar bark spun into a thread or cord. The woof is of yarn spun from the wool of the mountain goat. (The details of the weaving are shown in Plate x, Fig. 33a.) Much confusion exists on this point. The mountain goat resembles our domestic animal in external appearance, but has beneath the hair an inner coat of white, soft, silky wool, while the mountain sheep (big-horn) has a thick covering of hair like a deer. The fringe on the side is shorter than on the bottom. The wool is woven into a pattern representing the totem of the owner, different dyes being used in the wool, the conventional colors being black, yellow, white, and sometimes brown. The black is obtained from charcoal and the yellow dye from a moss called *sekhone* (Tlingit). The blanket is woven in different designs skilfully blended into a complete pattern, as in tapestry, Fig. 33. A ceremonial coat or gown similar in design is also woven in this way. A specimen is figured in Plate x, Fig. 34. The details of the method of weaving both these garments are shown in Fig. 33a, same plate.

Chief's ceremonial head dress.—In connection with this blanket and coat or gown, a conventional head dress is worn by the chiefs in this northern region. These are shown in Plate x, Fig. 35, and consist of a cylindrical wooden frame about 10 inches high, with an elaborately carved front of hard wood, beautifully polished, painted, and inlaid with abalone shell and copper. Pendent behind is a long cloth, on which are closely sewn the skins of ermine, which form an important item in a chief's outfit. Around the upper periphery of the head-dress is an elaborate fringe of seal-whiskers. In ceremonial dances the space within this fringe and the top of the head-dress is filled with eagle or other bird's down, which falls like snow in the motions of the dance. This costume is completed by leggings of deer's hide, ornamented with the beaks of puffins, which rattle with the movements of the wearer. These are shown in Fig. 36, Plate x. The costume complete as worn by a chief is figured in Plate ix.

Amongst northern tribes these ceremonial blankets are worn by the chiefs. Amongst the Haida, women of rank also wear them in the dances. In all its details, the costume shown in Plate ix well illustrates the height to which the native arts of weaving, inlaying, carving, and dyeing had risen on this coast before being influenced by the advent of the whites.

The dress of a Chilkat chief, encountered by Vancouver at Lynn Canal in 1794 is thus described by him :

His external robe was a very fine large garment that reached from his neck down to his heels, made of wool from the mountain sheep, neatly variegated with several

EXPLANATION OF PLATE IX.

GENERAL TYPE OF TSIMSHIAN, HAIDA, AND TLINGIT CHIEF'S COSTUME.

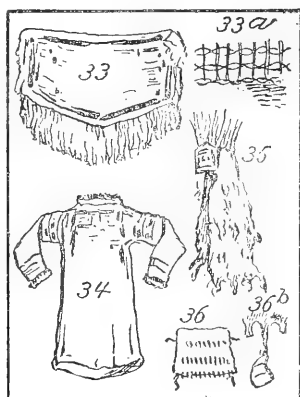
From photographs and sketches by the author

The details of this costume are shown in Plate X. In the top of the head-dress, within the fringe formed by the seal whiskers, aquatic birds' or eagles' down is generally placed, which, in the ceremonial dances, falls and floats in the air about the wearer like snow on a winter's day, adding much to the picturesqueness of the scene.



GENERAL TYPE OF TSIMSHIAN, HAIDA, AND TLINGIT CHIEF'S COSTUME.

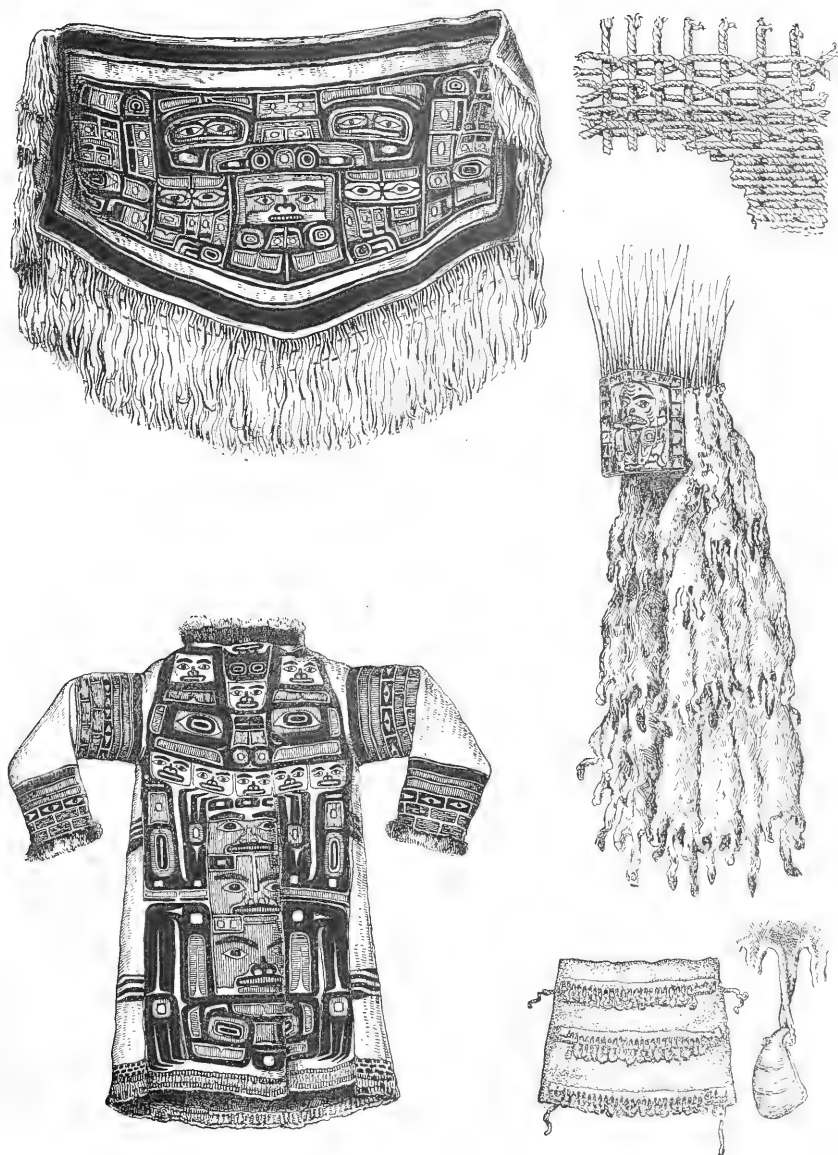
EXPLANATION OF PLATE X.



DETAILS OF CHIEF'S COSTUME, AS SHOWN IN PLATE IX.

From photographs and sketches by the author

- Fig. 33. CEREMONIAL BLANKET. Worn by Indians of rank and wealth on the Northwest coast, commonly called a "Chilkat blanket," because the best specimens come from the Chilkat country, although other tribes are more or less expert in weaving them. The warp is composed of twisted cord or twine of cedar bark fiber, and the woof of worsted spun from the wool of the mountain goat. Brown, yellow, black, and white are the colors used, and these are skillfully wrought into a pattern representing the totem or a totemic legend of the owner. The details of the weaving are shown in Fig. 33a. The design on both the blanket and the ceremonial shirt represents Hoorts, the bear.
- Fig. 34. CEREMONIAL GARMENT OR SHIRT. Woven as described above. The trimming on the collar and cuffs is sea-otter fur.
- Fig. 35. CHIEF'S CEREMONIAL HEAD-DRESS. Carved from hard wood, beautifully inlaid, painted, and polished. The erect fringe on the upper circumference is formed by seal whiskers set into the frame. The pendent trail is made from three lengths of ermine skins, there being about ten skins in each row. The top of the head-dress is filled with birds' down on ceremonial occasions, and in the motion of the dances this sifts through and falls like snow about the person of the dancer.
- Fig. 36. BUCKSKIN LEGGINGS. With three rows of puffin beaks, which rattle with the motion of the wearer. This style of legging is also made from ordinary cloth, or from the woven blanket stuff, similar to Fig. 33.



DETAILS OF CHIEF'S COSTUME, AS SHOWN IN PLATE IX.



colors, and edged and otherwise decorated with little tufts or frogs of woolen yarns dyed of various colors. His head-dress was made of wood, much resembling in its shape a crown, adorned with bright copper and brass plates, from whence hung a number of tails or streamers, composed of wool and fur wrought together, dyed of various colors, and each terminating by a whole ermine skin.*

Another variety of this blanket is described by Lisiansky (1805), as seen by him near Sitka :

These blankets are embroidered with square figures, and fringed with black and yellow tassels. Some of them are so curiously worked on one side with fur of the sea-otter, that they appear as if lined with it, and are very handsome.†

This is not unlike a blanket described by Vancouver, as worn by the Kwakiutl, Johnstone Strait, British Columbia (latitude 52° 20' N.), as follows :

The clothing of the natives here was either skins of the sea-otter or garments made from the pine bark. Some of these latter have the fur of the sea-otter very neatly wrought into them, and have a border to the sides and bottom decorated with various colors. In this only they use woolen yarn, very fine, well spun, and dyed for that purpose, particularly with a very lively and beautiful yellow.‡

The art of weaving.—These fine bark garments are found also amongst the Tsimshian, who either made them or traded for them with the Kwakiutl, giving in exchange sea-otter skins.§ In general, while the art of cedar bark weaving was understood throughout the coast, and while the southern Indians had some knowledge of weaving in wool, it may be said that the northern Indians were more expert in weaving wool and making baskets of grass, and the southern Indians in weaving bark fibre. To-day, at the two extremes, we find the northern Tlingit tribes, and the Makah Indians of Cape Flattery, the expert basket makers, but the character of their work is so different that it can be readily distinguished. The southern tribes are also the expert cedar bark weavers, and the northern Tlingit the best weavers of wool. Wherever these or other arts may have been developed, it is amongst the Haida of the Queen Charlotte Islands that we find the best specimens of workmanship. Originally the wealthiest stock on the coast, they have from earliest times been remarkable for their readiness to adopt the customs and ideas of others, and to develop and adapt them to their own peculiar needs. The Tsimshian seem to have acted as the middlemen, for most of the trade and intercourse of the Haida with the other tribes has been through them. In this way it will be found that the Tsimshian have influenced the Haida not a little in the development of their peculiar customs and ideas.

Modern dress.—The change in ordinary dress, as the Indians became stripped of sea-otter and seal skins, consisted largely in the substitution

* Vancouver, Voyage, Vol. III, p. 249-50.

† Lisiansky, Voyage, p. 238.

‡ Vancouver, Voyage, Vol. II, p. 281.

§ *Ibid.*, p. 325.

of cloth for garments and European blankets for fur cloaks. Langsdorff says of the Tlingit in 1806:

The clothing of these people is very simple, consisting of a covering around the waist, and an outer garment made of a piece of cloth or skin about 5 feet square, two ends of which are either tied round the neck or fastened together with a button and button-hole.*

The favorite colors were red and blue, but this costume was only worn about the villages. Out hunting and fishing they practically went naked. Later, when the European blanket replaced the cloth cloaks, they were ornamented with a border of red or blue cloth, on which was sewn rows of pearl buttons, thimbles, Chinese coins, etc. This style of blanket obtains to-day. (See Plate XI.) Plate XI represents the modern costume of the Tlingit. The ear pendants of the man are shark's teeth. The labret of the woman is bone or silver, and illustrates the transition stage from the large labret to none at all, or almost none.

The early voyagers were astonished at the demand for thimbles on the coast, and supposed the women to need them for sewing. It was found, however, that the use of the needle was very little understood,† and that the thimbles were regarded as rare ornaments for blankets and clothing. Formerly abalone and dentalium were looked upon as the most valuable kind of trimmings and ornaments, but their importation in quantities by Europeans cheapened their value. The Chinese coins were admired for the cabalistic characters on them.

The women early adopted European dress, supplemented with the ordinary blanket. The present costume, with headkerchief of black silk, is seen in Plate XI. The earlier costumes, however, were ornamented more elaborately. On the dress were tightly-fitting stays of cloth, often of scarlet color, ornamented with pearl buttons. These, with silver or bone nose-rings, bracelets on the arms, braids of silk or red worsted in the ears, and European blankets across the shoulders, made up the costume of the Indian women around Dixon Entrance up to more recent years, since when plain "store clothes" have displaced the former more gaudy vestments. To complete the former costume, it should be added that the hair worn long, was usually parted in front and bound club-shaped behind with scarlet cloth. At present the hair is usually worn in two plaits down the back. Both sexes as a rule go barefooted, but before the introduction of European shoes moccasins of one or two thicknesses of deer or elk hide were worn in cold weather. The older Indians still wear them in out-of-the-way localities. These they either make themselves or trade for with the Tinné tribes of the interior.

Head-covering.—Both sexes, until recent years, either went bare-headed, or wore hats woven of grass and painted with the totem of the owner. In ceremonies, of course, various styles of ceremonial head-dresses are and were formerly worn; and in war costume, heavy wooden helmets protected the head. At present, all styles of European hats

* Langsdorff, Voyages, Pt. II, p. 112.

† Lisiansky, Voyage, p. 241.

EXPLANATION OF PLATE XI.

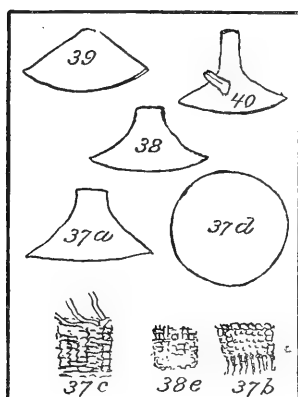
MODERN TLINGIT MALE AND FEMALE COSTUMES.

The costume of the man is more or less ceremonial, as the native dress has recently been generally abandoned and European clothes adopted. The dress of the women is that now generally worn by all the northern Indian women. The plate represents the costume of ten or twenty years ago, and in this sense is modern. The labret, a small cylinder of silver with a broad head, is the modern style of lip-ornament, differing materially from the large ones worn until a few years ago.



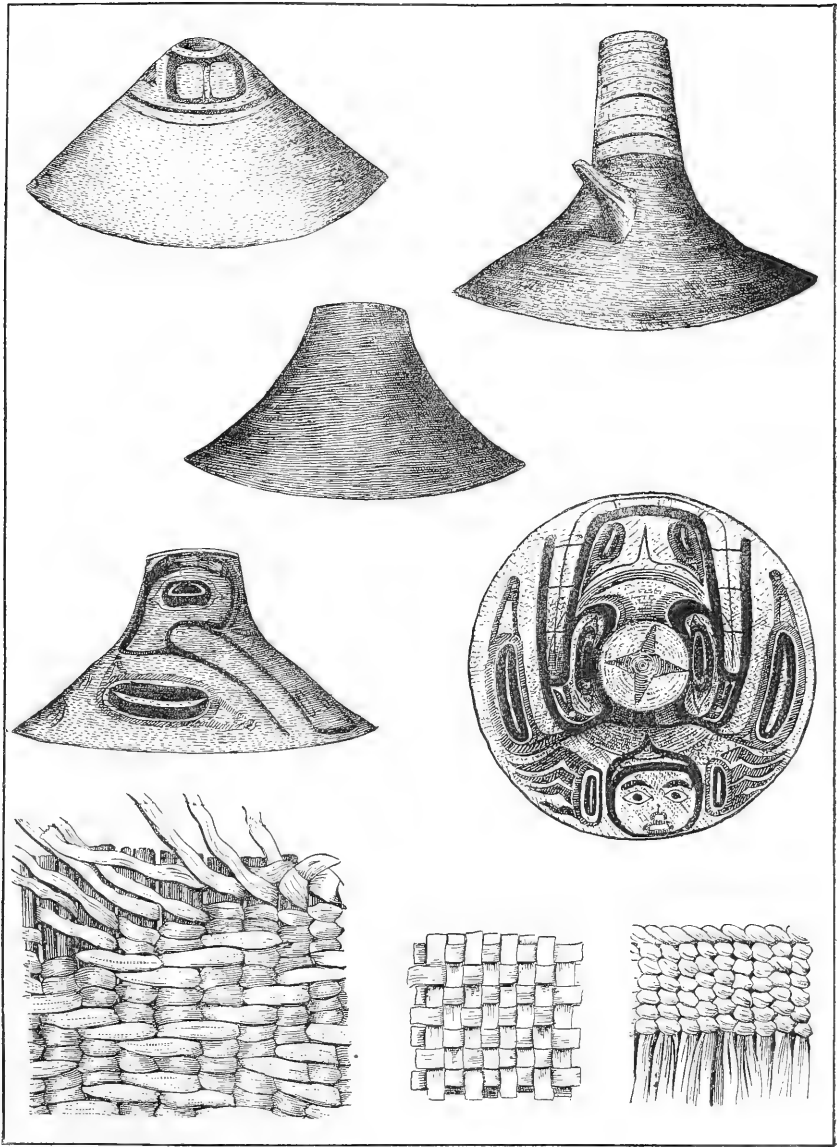
MODERN TLINGIT MALE AND FEMALE COSTUMES.

EXPLANATION OF PLATE XII.



TWINED GRASS AND SPRUCE ROOT HATS FROM THE NORTHWEST COAST.

- Fig. 37. **TWINED BASKETRY HAT.** Twining consists in weaving the woof-strands around a series of warp-strands. Two methods are employed in this hat. The letter *a* (Fig. 37) marks the boundary between the crown and brim. Above *a*, the mode of twining is that shown in Fig. 37*b*; below *a*, that shown in Fig. 37*c*. Fig. 37*d* is a top view of this same hat, showing the totemic device, Hooyeh, the Raven, painted in black and red. Cat. No. 89033, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 38. **TWINED BASKETRY HAT.** Fig. 38*e* shows the method of plaiting cedar-bark fiber. This hat differs from Fig. 37 only in being lower and flatter.
- Fig. 39. **PARASOL-SHAPED HAT.** Ornamented with a totemic design at the top and painted in solid color on the remainder of the outside surface. Cat. No. 1782, U. S. N. M. Tlingit, Alaska. Collected by Dr. Suckeley.
- Fig. 40. **TWINED BASKETRY HAT.** With wooden appendages representing the beak of the raven "Hooyeh." From photograph in U. S. National Museum. Tlingit Indians, Alaska.



TWINED GRASS AND SPRUCE ROOT HATS FROM THE NORTHWEST COAST.

and caps are worn, but the women use generally only a black silk handkerchief. The grass hats are still seen on the coast in out-of-the-way places, particularly around Dixon Entrance. These are cone-shaped, with considerable spread, being particularly adapted for protection, in rainy weather, to the elaborately dressed hair worn on ceremonial occasions. In the north, the truncated cone-shaped form is surmounted by a more or less tall cylinder, in the ceremonial hats reaching an absurd height; in the south, it becomes more parasol-like in shape, although both styles are found throughout the whole coast, excepting that the very tall ceremonial hat is limited to the north. Plate XII illustrates the varieties. Fig. 37 is the usual type, ornamented with the totemic device representing the Raven, painted on the hat in red and black, the detail being shown in Fig. 37*d*, which is a top view of Fig. 37. The details of the weaving or twining are illustrated in enlarged section in Figs. 37*b* and 37*c*. The hat naturally divides itself into two sections—the crown and the rim—the dividing line being at *a* in Fig. 37. The method of making the crown is the same as that used in the Haida basketry, and shown in 37*b*, while the rim is woven by a variation in the above method shown in Fig. 37*c*. These figures are from an article by Professor O. T. Mason on Basket Work, in Smithsonian Report, 1884, Part II. Of Fig. 37*c* he says: "It shows the regular method of twined weaving, the introduction of the skip-stitch or twilled weaving into the greatest variety of geometric patterns, and the ingenious method of fastening off by a four-ply braid showing only on the outer side." At the dividing line, marked *a*, on the inside, a cylindrical head-band of spruce root is stitched to make the hat fit the head, a string passing under the chin being usually added. Fig. 38 is an ordinary type of spruce root hat also found on the coast. Amongst the southern Indians, where cedar bark is so much used, these two styles of hat are reproduced in that material, which, not being tough enough to twine, is woven, as shown in detail in Fig. 38*e*. This is the same pattern as their mats. The hats thus made are light and flimsy and soon lose their shape, whereas the twined spruce root ones and the baskets both retain their shape and become water-tight after a preliminary soaking. Fig. 39 is another variation in the shapes found on the coast. It is often painted in solid colors and ornamented on top with a totemic design. Fig. 40 is a ceremonial head-dress, similar in design and outline to the wooden helmets illustrated in Plate XIII. This shape is seen in the carvings in the large totemic columns, and is doubtless an imitation of the wooden helmets formerly worn in battle. These survivals and imitations are spoken of elsewhere. The animal represented in Fig. 40 is the Raven.

Rain Cloaks.—Along the whole coast a peculiar form of cloak was worn in rainy weather to shed water. Dixon (1787) says of them, as seen at Sitka: "I had no opportunity of examining them minutely, but they appear to be made of reeds, sewed very closely together, and I was told by one of our gentlemen who was with Captain Cook during

his last voyage that they were exactly the same with those worn by the inhabitants of New Zealand."* Mackenzie mentions this rain dress amongst the Bilqula (1793).† These mats or cloaks were circular in form, with an opening in the center for the head.

Ceremonial Paraphernalia.—The origin of the custom of wearing ceremonial masks and head-dresses, in this region, would seem to have originated in the actual wearing of them in war. Much of the ceremonial display amongst these Indians has reference to prowess in combat, and it is an undoubted fact that, in the survival of many primitive implements of war we have the origin of much of the dance and ceremonial paraphernalia peculiar to this region.

With the desire to protect the body, armor naturally originated. The masks and visors worn were painted in all the hideous colors and patterns adopted ordinarily for the face. They were sometimes carved with representations of the totem of the owner, but were intended in any case both to protect the wearer and to strike terror to the enemy. Vancouver (1793) mentions an encounter with the Tlingit, up Behm Canal, Alaska, in which the chief put on a mask consisting of a "Wolf's face compounded with the human countenance." The masks were often worn without head pieces or visors, and some of them were so thick that a musket ball fired at a moderate distance could hardly penetrate them.‡

There seems nothing unreasonable in tracing the origin of much of the dance and ceremonial paraphernalia to customs originating in war. Most of our secret and benevolent societies which parade in public have a military organization and uniform. The grass hat shown in Fig. 40, Plate XII, is in imitation of the wooden war helmet, and other survivals will be pointed out from time to time.

Armor.—Formerly the body was protected in combat by various devices, the simplest being a leather garment, jerkin, or doublet. This was usually made of one, two, or three thicknesses of hide and in itself offered considerable resistance to arrows, spears, or dagger thrusts, but was still further re-inforced by a cuirass or coat of wood, made of strips or slats, worn either over or under the doublet, but usually over. These are illustrated in Plate xv, Figs. 52 and 53. The doublet or shirt has an opening for the neck and one for the left arm; the right side is not sewed up, facilitating the putting on of the garment and being secured by ties or toggles and straps. There are two other admirable specimens in the National Museum (Nos. 46465 and 60240), but as they are similar in patterns to the one illustrated in Plate xv they are not reproduced here. They differ only in having shoulder pads of hide secured on by toggles and straps and in offering some protection to the arms. Vancouver (1793) thus describes a similar shirt worn by a war party of Nass, which his boat parties encountered:

Their war garments were formed of two, three, or more folds, of the strongest hides of the land animals they are able to procure. In the center was a hole sufficient to

* Dixon, Voyage, p. 191.

† Mackenzie, Voyages. p. 371.

‡ Lisiansky, Voyage, p. 150.

admit the head and left arm to pass through, the mode of wearing them being over the right shoulder and under the left arm.

The left side of the garment is sewed up, but the right side remains open; the body is, however, tolerably well protected, and both arms are left at liberty for action. As a further security on the part which covers the breast they sometimes fix on the inside thin laths of wood.*

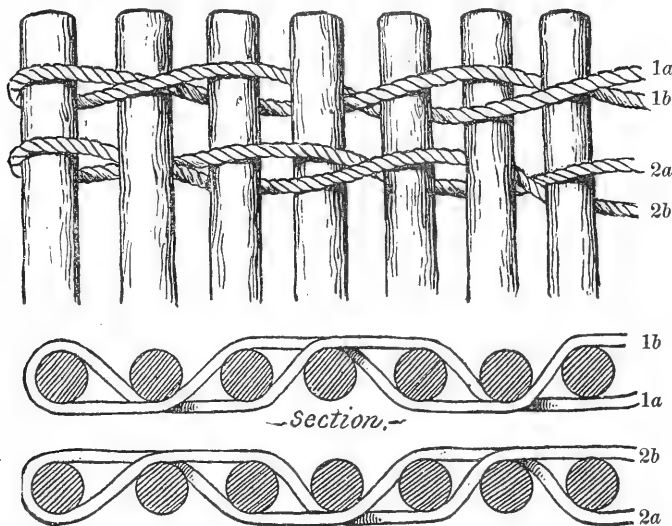


Fig. 46.

DETAIL OF WEAVING ARMOR.

(Cat. No. 49213, U. S. N. M. Thingit. Collected by J. J. McLean.)

Fig. 53 is a rear view of a wooden cuirass or body armor from Sitka, showing method of strapping it to the body. It is from a specimen in the National Museum (No. 49213) consisting of numerous (seventy-four) rods of hard wood about 2 feet long, woven together with dark and white twine in alternate bands. The threads are sometimes single and sometimes in pairs, and are made to pass over and under the rods in pairs, but in such manner that the overlappings alternate from one row to the next. This is shown in detail in Fig. 46, where 1a and 1b represent the parts of one cord, and 2a and 2b represent those of another. The view represents the upper left hand corner of the weaving and two upper threads, showing seven rods in both plan and section. As stated, this method of running the cords or twine is varied by occasionally running them in pairs. Fig. 43, Plate XIII, is a front view of the same specimen of armor. Fig. 49, Plate XIV, represents another variety of body armor in which the wood is in the shape of laths or broader flat strips of wood, also woven together with twine. Strips of hide were sometimes used to secure the strips of wood together; and sometimes the breast piece or covering was in one solid thick piece. The armor shown in Plate XIV is from a sketch in Lisiansky's Voyage, p. 150, Plate I. The method of wearing it is shown

* Vancouver, Voyage, Vol. II, p. 339.

in Fig. 51, Plate XIV, which also shows the mask and helmet in place. The parts are very heavy and clumsy, and the most that can be said in their favor is that they protected the vital parts from injury.

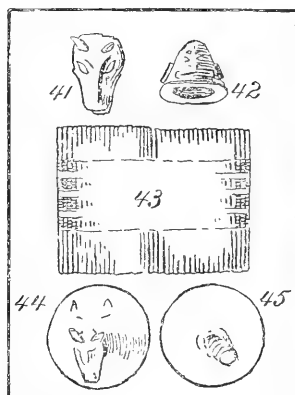
With the introduction of iron and of fire-arms the Tlingit adopted a new form of protection, consisting of a buckskin strip around the neck, with iron plates attached pendant down the breast.*

Helmets and head-dresses.—The chief's ceremonial head-dress has already been described, and is illustrated in Fig. 35, Plate X. In Plate XIII a variety of helmets is shown. Fig. 41 represents a wolf's head, the wearer or owner belonging to the Wolf totem. It is so light that it could not have served as a protection of any kind, and hence is ceremonial in its nature. Fig. 42 is a thick massive helmet similar to the one illustrated in Plate XIV, Fig. 47. Fig. 44 represents the Bear totem, while Fig. 45 is carved in representation of the Beaver. On the rim of the latter four copper plates or shields are painted. These two helmets (Figs. 44 and 45) are similar in shape to the grass hat shown in Fig. 40, being that of an oblique truncated cone surmounted by a tall cylinder, and evidently represent the ancient form of helmet worn by the chiefs as seen in the carved columns and other old-time pictographs. They are now worn only in the ceremonial dances, the two illustrated being of light cedar wood and of rather recent make. Another variety of head dress is a ring of shredded cedar bark, twisted into a rope, stained dull red with the juice of the bark of the alder, and made into a circular grommet like a crown Plate XVIII. Some of these are ornamented with bows, rosettes, and tassels of the same material, the finest and most elaborate being found amongst the Haida, although clearly borrowed or copied in design from those of the Tsimshian and Kwakiutl. With the latter these are only worn in the winter religious ceremonies, and their use is considered improper on any other occasions, whereas the Haida wear them in any of their dances without the peculiar significance attached to them by other tribes.

Masks.—What has been said in a general way of helmets and head-dresses is equally true of masks, with the addition that the latter are found even in much greater variety and more ingenuity is displayed in constructing them. The writer has endeavored to trace the origin of the custom of wearing masks in ceremonies to the original practice of wearing them in war as a protection. In this view, the simplest form is that shown in Figs. 48 and 50, Plate XIV, the former being a side and the latter a top view. The top rim is thinner than the lower part, and has several grooves or peep-holes cut in it to enable the wearer to see through, as shown in the plate. The front is carved or painted with the totemic representation of the owner. Fig. 50 shows a projection on the inner side (front), which consists of a leather becket or eyelet, covered with a wrapping of grass or cedar bark, and let through the front of the mask, being secured by a knot outside. This goes in the

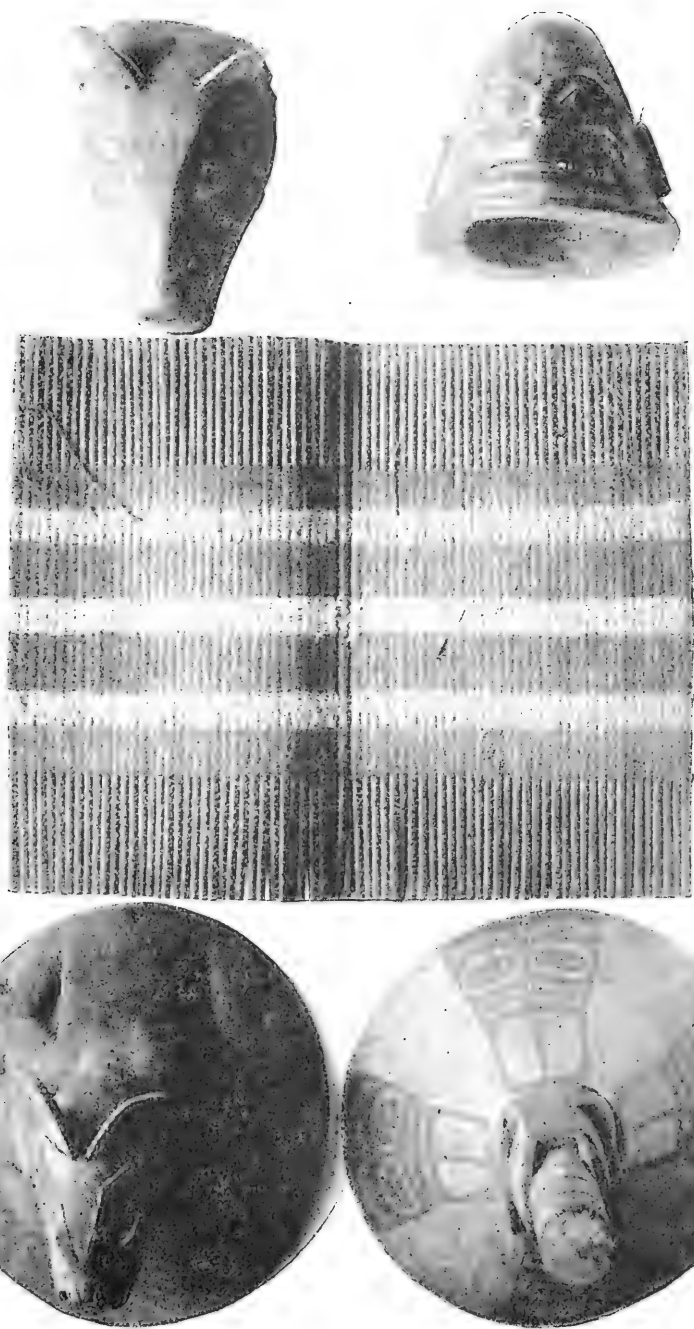
* Lisiansky (1805), Voyage, p. 238.

EXPLANATION OF PLATE XIII.



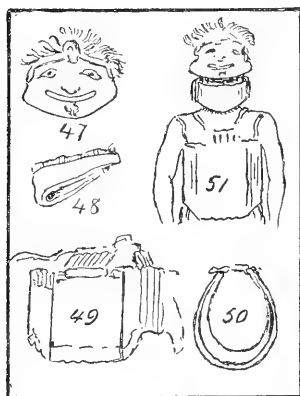
WOODEN HELMETS AND CUIRASS, OR BODY ARMOR.

- Fig. 41. WOODEN HELMET. Carved in shape of wolf's head. Cat. No. 23441, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 42. WOODEN HELMET, similar to Fig. 47, Plate XVI. Cat. No. 74341, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 43. WOODEN ARMOR. Made of hard wood rods woven together with twine. Detail in Fig. 46. Another view is given in Plate XV (Fig. 53), showing method of securing it to the body. Cat. No. 49213, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 44. HELMET. Carved to represent Hoorts, the bear. Cat. No. 89037, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands. Collected by James G. Swan.
- Fig. 45. HELMET. Surmounted by a carved figure of Tsing, the beaver. The painted figures represent copper plates, emblems of wealth and influence. Cat. No. 89035, U. S. N. M. Skedan Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



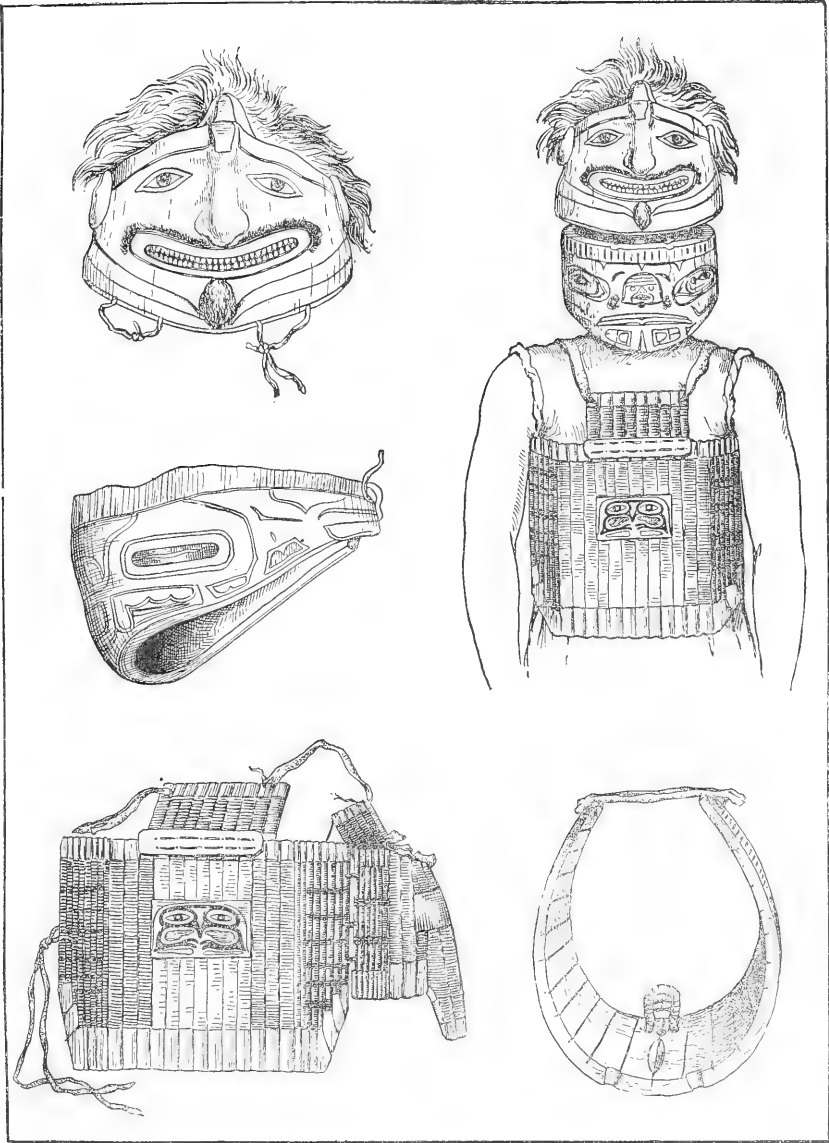
WOODEN HELMETS AND CUIRASS, OR BODY ARMOR.

EXPLANATION OF PLATE XIV.

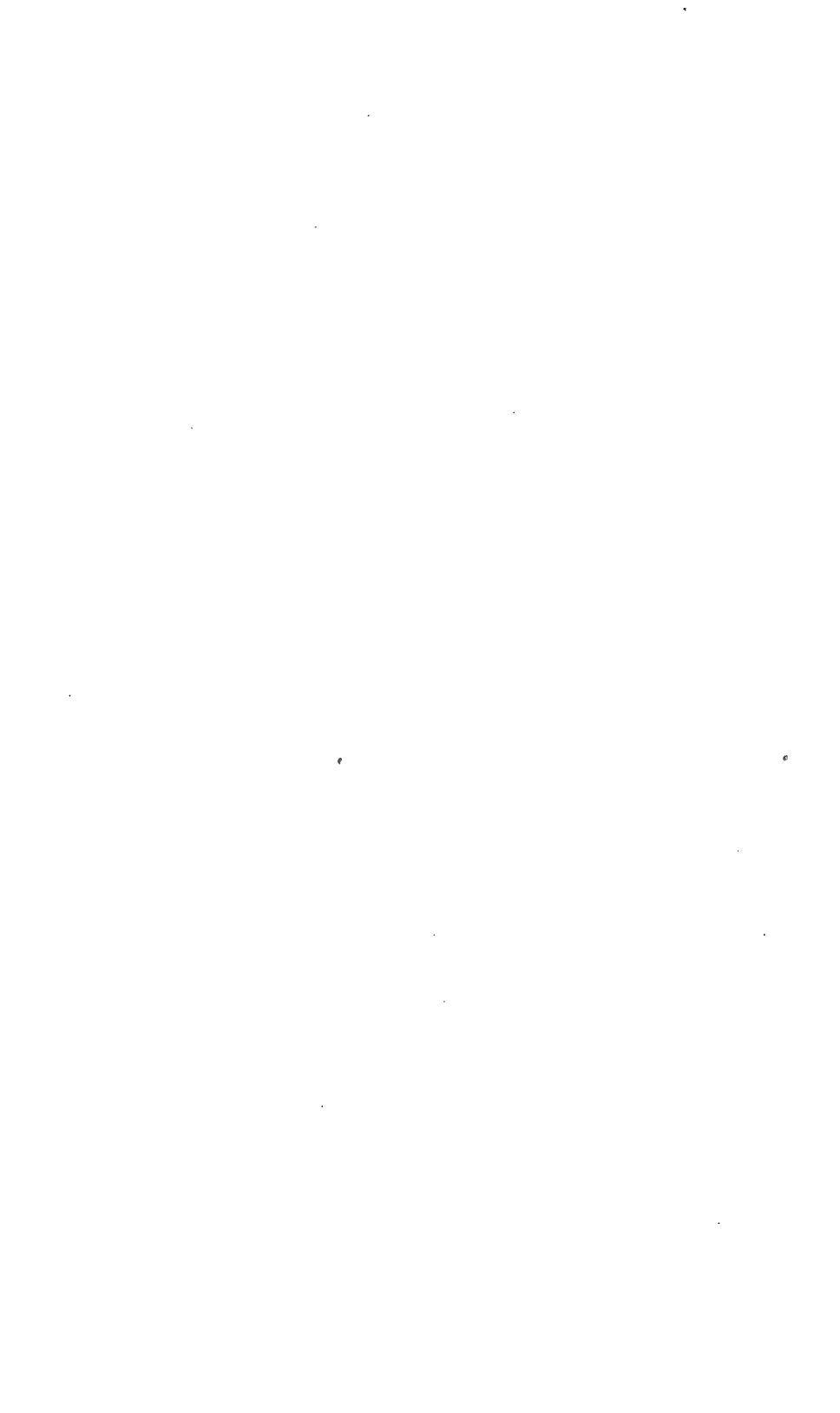


TLINGIT WOODEN ARMOR.

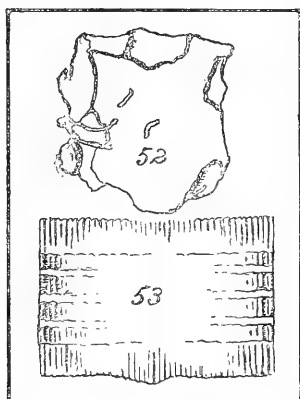
- Fig. 47. WOODEN HELMET. Secured to the head by straps fastened under the chin. From Lisiansky, Voyage, Plate I.
- Fig. 48. WOODEN MASK OR VISOR. Showing holes for eyes. Side view. From Lisiansky, Voyage, Plate I.
- Fig. 49. BODY ARMOR. Made of slats of wood fastened together by twine woven around and between them. From Lisiansky, Voyage, Plate I.
- Fig. 50. MASK OR VISOR. Showing becket or strap, which is held in the teeth to keep the mask in place when worn in fighting. Made of one piece of wood, bent to shape and held by a strap of leather, as shown at *a*. Cat. No. 74343, U. S. N. M. Tlingit, Alaska. Collected by J. J. McLean.
- Fig. 51. SKETCH. Showing method of wearing the armor.
The leather jerkin underneath is similar to that shown in Plate XV.



Tlingit Wooden Armor.



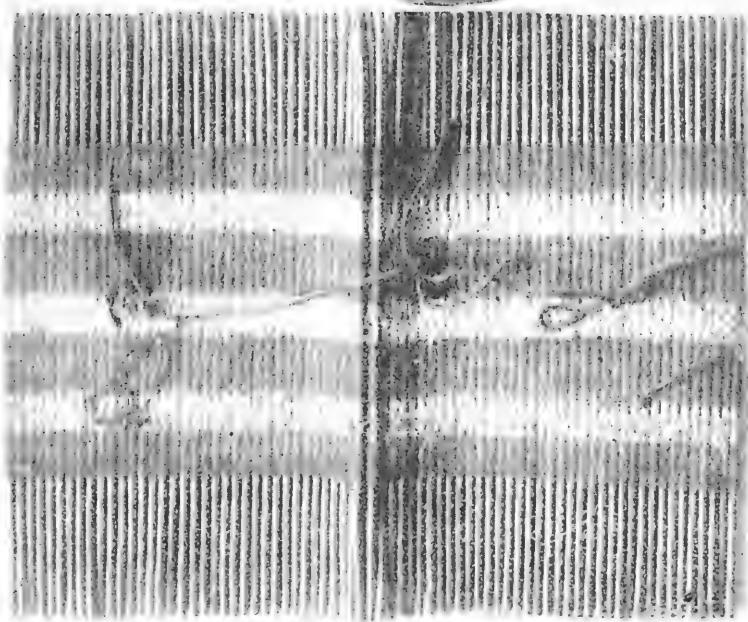
EXPLANATION OF PLATE XV.



WOODEN AND LEATHER BODY ARMOR.

Fig. 52. JERKIN. Of two thicknesses of moose hide. Worn under the armor (shown in Fig. 53) as an additional protection to the body. The left side has an arm-hole; the right side is open, being secured by straps under the right arm. Cat. No. 130587, U. S. N. M. Tlingit Indians, Alaska. Loaned by Max B. Richardson.

Fig. 53. ARMOR OF WOODEN RODS. Inside view of Fig. 43, Plate XIII, showing straps by which it is secured around the waist. Cat. No. 49213, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.



Foot

WOODEN AND LEATHER BODY ARMOR.

mouth of the wearer, and is firmly gripped in the teeth to hold the mask in place. Above this becket the mask is recessed or hollowed slightly, to give a clearance to the nose of the wearer. Altogether it may be seen to be a very clumsy method of protecting the face. Other kinds of masks were worn to protect the face in war, having the additional objects of representing in their carved outlines the totem of the wearer, or, by their hideousness and grotesqueness, of striking terror to the enemy by lending to the effect of their menacing gestures the appearance of some superhuman being. Often these masks were so massive as to be worn without helmets or head pieces. Straps or thongs of leather fasten them to the head, or a loop of cedar bark cord in the hollow side of the mask is held in the teeth.

The ceremonial masks are carved from spruce or yellow cedar and are generally very elaborate, being highly colored in grotesque or hideous designs, and often inlaid with abalone shell or copper. The eyes are pierced through to enable the wearer to see about him, and the mouth is also usually cut through, or, if not, teeth are carved or inlaid in bone. Lips, teeth, nostrils, and eyelids are sometimes represented in copper. The top of the mask is usually bordered either with hair, feathers, or down. By means of ingeniously concealed mechanism the eyes are sometimes made to roll and the jaws and beak to snap. (See Fig. 60, Plate XVI). Some of them, representing ravens and cranes, have beaks projecting from two to four or five feet. In conjunction with the masks are often worn wooden fins or wings on the back of the head or on the back at the shoulders. Fig. 59, Plate XVI, represents the raven as a ceremonial mask with lips of copper, surmounted by a tall fin of wood representing the fin of the orca or killer. This is fringed with human hair, and the figure carries in its mouth a bow and arrow of copper. Fig. 56 represents a woman's face, with nose and lip ornaments of conventional pattern, and with curiously painted lines in unsymmetrical design. A variety of masks are sketched in the foreground of Plate LXVII. The custom of wearing wooden masks and head-dresses in ceremonies and dances is found throughout the whole northwest coast from the Aleuts to Puget Sound. There is a large collection of these in the National Museum, which in themselves are worthy of separate illustration. The limits of this paper admit only of presenting the few shown in Plates XVI and LXVII.

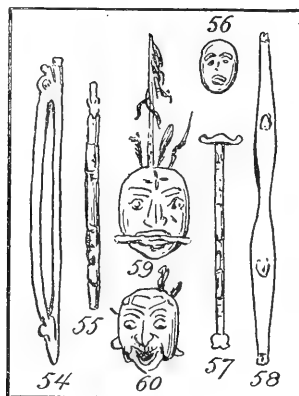
Ceremonial Batons, Wands, etc.—In Plates XVI and XVII are represented various ceremonial implements carried in the hands of the chiefs and shamans on state occasions, and permitted to be carried only by men of such rank. Fig. 54 is a carved representation of a bow, the figures on the ends representing the whale. It is carried by the Haida shamans in their medicine dances. Fig. 58 is a ceremonial bow carried by a Haida chief. The two carved heads represent the bear. Carved ceremonial arrows go with this type of bow, and in them we see the survival of the ancient weapon as a purely ceremonial emblem, just as

to-day we have the court sword as a survival of the sword or rapier carried by gentlemen of other periods. In the same way, Fig. 63 is a Tlingit ceremonial dance wand in the shape of a dagger; and Fig. 64 is a Haida baton (called by them *Taskear*), in the shape of a war lance of earlier days. Fig. 55 is a fragment of an ancient Haida baton (*Taski* or *Taskear*,) the lower part being missing. The top figure of the carving represents the raven, below that the crow, and then the whale. Between the whale and the next lower figure, which is *Skamson*, the sparrow-hawk, is a spindle and socket, which pull apart. The sparrow-hawk rests on *Skillik*, the ceremonial hat, which in turn rests on *Tsing*, the beaver. This baton is carried in the hand by the chief on the occasion of a great potlatch or feast. At a given signal the two parts are separated and the distribution of presents begins, the chief retaining one part in each hand. Fig. 57 is a carved cane or wand from Vancouver Island, British Columbia, inlaid with pearl shell, and is the finest specimen of native carving from the southern Indians in the Museum. Figs. 61, 62, and 65 are types of the Haida chiefs' batons or *Taskears*; they are held in the hand on occasions of ceremony. At a potlatch the chief calls the name of the recipient of a present, and then thumps on the floor if the gift is satisfactory to the guests, as explained later on. In the totemic theatrical exhibitions these batons indicate the totem and rank of the bearer. When a chief dies and is laid out in state the baton stands near his body. In Fig. 61 the top figure is a chief wearing a ceremonial hat, or *Skillik*, similar to the grass hat in Fig. 40. The lower carved figure is the frog. In Fig. 65 the upper figure is *Koot*, the eagle, and the lower *Tsing*, the beaver.

Rattles, Snappers, and Whistles.—In dealing with ceremonial paraphernalia it might be well to describe here all the accessories of ceremonial costumes, such as the accompanying rattles, snappers, drums, whistles, etc. These, however, are reserved for Chapter VII, where they are dealt with as musical instruments.

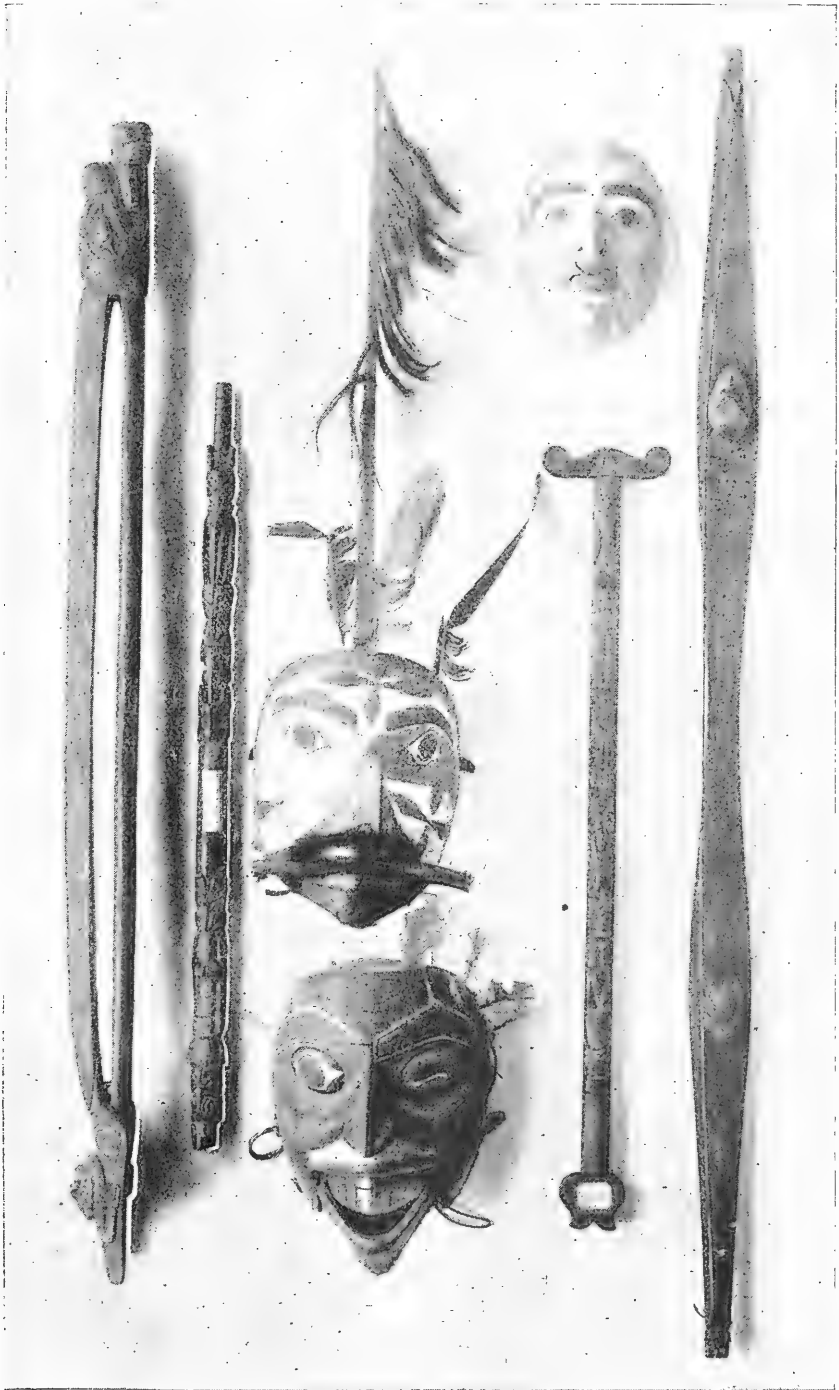
Ceremonial Blankets.—In connection with Plates IX and X, a very well-known type of chief's ceremonial costume has been described in this chapter. The Chilkat and cedar-bark blankets are important factors in all ceremonial dances and functions. Other forms of ceremonial blankets or mantles are made from Hudson Bay Company blankets, with totemic figures worked on them in a variety of ways. The usual method is to cut out the totemic figure in red cloth and sew it on to the garment (ornamenting it with borders of beads and buttons) by the method known as appliqué work; another method is to sew pieces of bright abalone or pearl shell or pearl buttons on to the garment in the totemic patterns. Plate XIX well illustrates the appliqué method. Fig. 74, Plate XIX, is a vestment which hangs pendant down the back, representing the totem or crest of the wearer. Fig. 75 represents a cloak with a neck opening ornamented in red cloth with the totemic design of the Orca or killer.

EXPLANATION OF PLATE XVI.



CEREMONIAL DANCE PARAPHERNALIA.

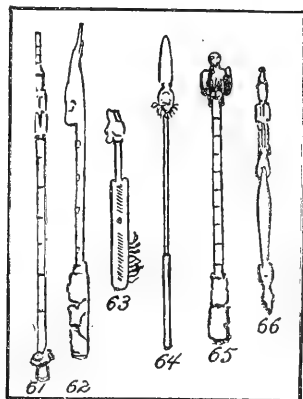
- Fig. 54. CEREMONIAL BATON OR WAND. In form of a bow. The ends represent the head and tail of the whale. Carried by the Shaman in medicine dances. Cat. No. 89099, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 55. CARVED CANE (*Taski*). Carried in the hand of the medicine man at a potlatch. Cat. No. 88123. Masset Indians (Haida), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 56. MASK. Representing woman's face with nose-ring and ceremonial paint. Cat. No. 21570, U. S. N. M. Tlingit Indians, Alaska. Collected by Dr. J. B. White, U. S. Army.
- Fig. 57. CARVED CEREMONIAL CANE. Cat. No. 150847, U. S. N. M. Kwakiutl Indians, Vancouver Island, British Columbia. Collected by James G. Swan.
- Fig. 58. CARVED CEREMONIAL BOW. Bear's head in relief. Carried by chief in ceremonies and dances as a wand, baton, or emblem of rank. Cat. No. 89096, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 59. MASK. Representing Hooyeh, the raven, with bow and arrow of copper in his mouth and with the fin of the orca above the head. Cat. No. 89043, U. S. N. M. Haida Indians, Laskeek, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 60. MASK. Representing a demon with mechanical apparatus for rolling the eyes and snapping the jaws. Teeth of copper. Cat. No. 89042, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



CEREMONIAL DANCE PARAPHERNALIA.



EXPLANATION OF PLATE XVII.



CHIEF AND SHAMAN CEREMONIAL BATONS.

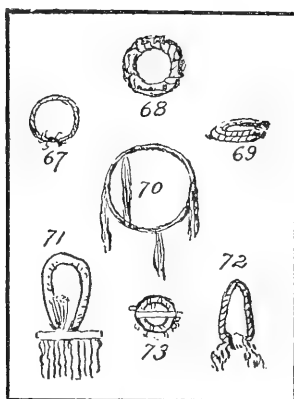
- Fig. 61. CHIEF'S BATON (*taskear*). Cedar wood. Carried on ceremonial occasions to denote rank. Lower figure, a frog; upper, chief with ceremonial hat. Cat. No. 89097, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands. Collected by James G. Swan.
- Fig. 62. CHIEF'S BATON (*taskear*). In dancing or when presiding over a feast the chief thumps on the floor with his baton to emphasize the time or to attract attention when about to speak. Cat. No. 89095, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 63. DANCE WAND. Carried in the hand. Ornamented with human hair. Cat. No. 127169, U. S. N. M. Hoodsinoo Indians (Koluschan stock), Alaska. Collected by Paymaster E. B. Webster, U. S. Navy.
- Fig. 64. DANCE WAND. Of wood, in imitation of ancient war spear. The carved head is ornamented with human hair. Cat. No. 74527, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 65. CHIEF'S CEREMONIAL BATON. Carved. Upper figure, Koot, the eagle; lower, Tsing, the beaver. Cat. No. 89098, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 66. SHAMAN'S BATON OR WAND. Supposed to possess magical powers. Carried by medicine man in his ceremonies. Cat. No. 89100, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



CHIEF AND SHAMAN CEREMONIAL BATONS.

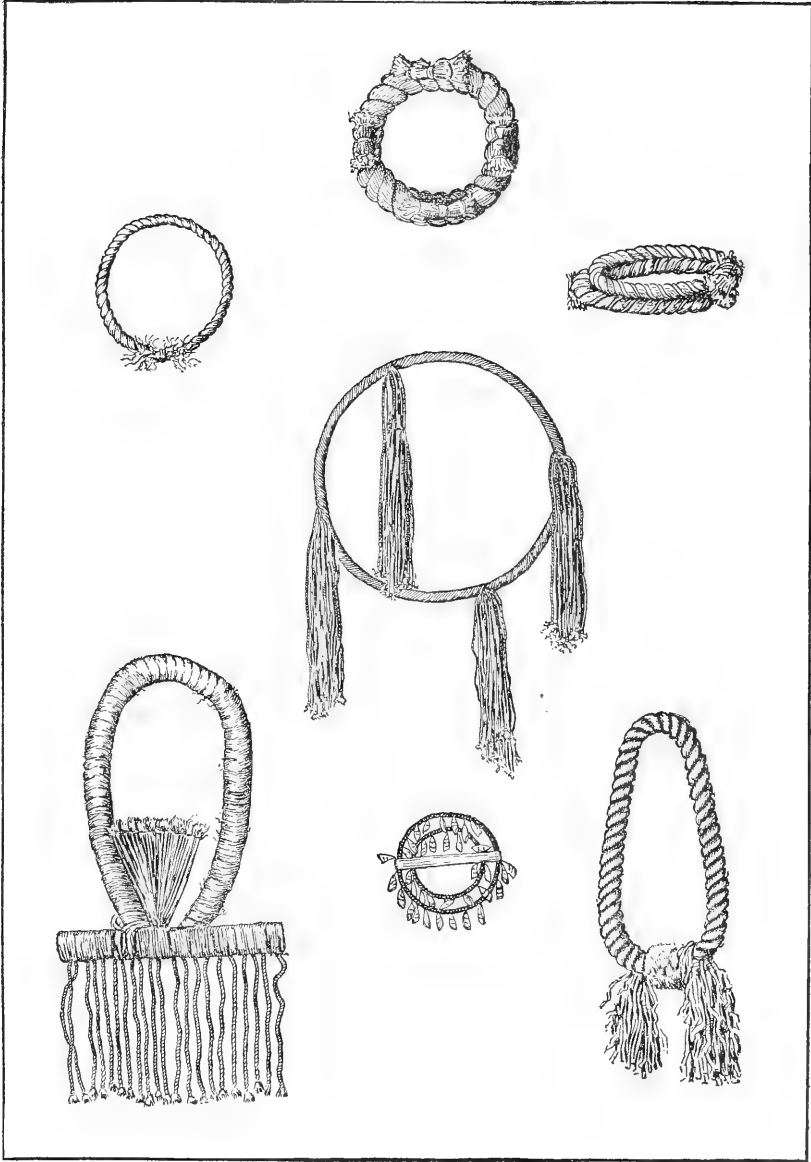


EXPLANATION OF PLATE XVIII.



RED-CEDAR BARK PARAPHERNALIA FROM THE NORTHWEST COAST, AND ANCIENT RATTLE.

- Figs. 67, 68, and 69. **HEAD-DRESSES.** Of cedar-bark rope, stained red with the juice of the alder. Worn in the winter ceremonial dances of the Kwakiutl and other southern coast Indians. This style borrowed by the northern Indians and worn by them in their ceremonials, but not with the same significance as in the south. Cat. Nos. 20849, 20910, Hoodsinoo Indians, Admiralty Island, Alaska. Collected by James G. Swan.
- Fig. 70. **NECKLACE.** Of cedar-bark rope, like those above, with pendent tassels of cedar-bark twine. Worn over right shoulder and under right arm. Figs. 67, 68, 69, 70, are Cat. Nos. 129513-15, U. S. N. M. Talcomk, sub-tribe of Bilqula Indians, Vancouver Island, British Columbia. Collected by Dr. Franz Boas.
- Fig. 71. **GIRDLE OR NECKLACE.** Of cedar-bark rope. Worn around the neck with the pendant down the back of the wearer in the south previous to going on a whaling expedition. Amongst the Haida it is simply a ceremonial ornament. No number.
- Fig. 72. **SASH.** Of cedar-bark rope. Worn over the shoulder. Ornamented with gulls' down. Cat. No. 72701, U. S. N. M. Stikine Indians, Alaska. Collected by James G. Swan.
- Fig. 73. **RATTLE.** Ancient form. Made of wood with pendent beaks of the puffin. This type of rattle is mentioned by many of the early voyagers. No number.



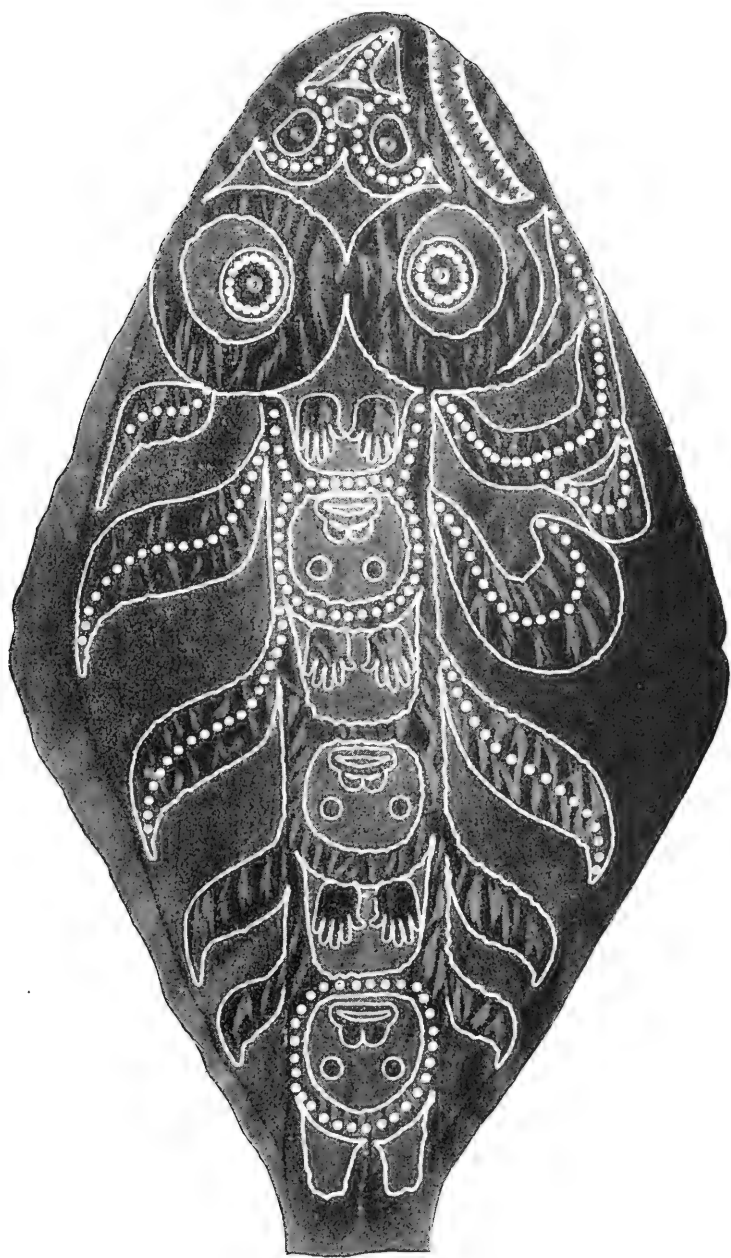
RED-CEDAR BARK PARAPHERNALIA FROM THE NORTHWEST COAST, AND ANCIENT RATTLE.



EXPLANATION OF PLATE XIX.

CHIEF'S BLUE CLOTH CEREMONIAL VESTMENT.

Fig. 74. The design represents the halibut, worked on in red cloth, edged with bead and button trimmings. While it is a modern garment, it shows the artistic skill of these Indians in working up every article of personal property into a totemic design. As a ceremonial vestment it is worn pendent down the back. Cat. No. 20679, U. S. N. M. Tsimshian Indians, Port Simpson, British Columbia. Collected by James G. Swan.



CHIEF'S BLUE CLOTH CEREMONIAL VESTMENT.



It is in the form of a truncated cone, with no openings for the arms. Other forms of ceremonial blankets are simply square pieces of cloth to go about the shoulders, ornamented in totemic designs, or with pend-

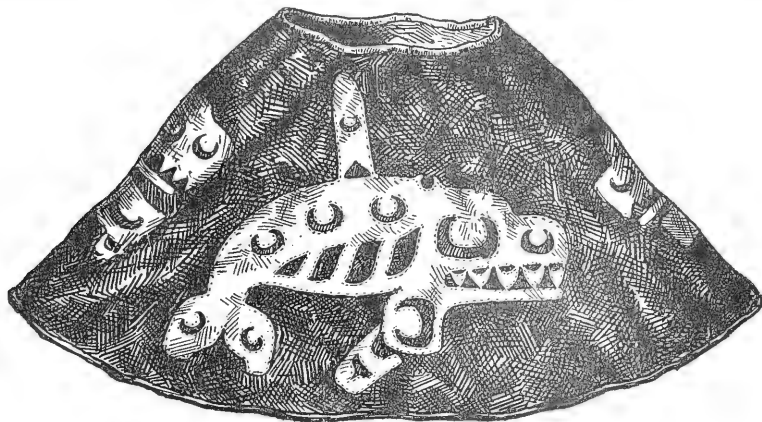


Fig. 75.

SHAMAN'S CLOAK.

(Cat. No. 89197, U. S. N. M. Skidegate, B. C. Collected by James G. Swan.)

ant puffin beaks or deer hoofs attached to a long fringe. These are sometimes of tanned deer skin, having the design painted on in a regular pattern in black and red colors.

Ceremonial shirts or coats.—Fig. 34, Plate x, represents a woven ceremonial coat of mountain goat's wool as already described. Other forms are made of cloth or blanket material and ornamented with totemic designs, as described above. Fig. 75a represents the Sea Lion, and Fig. 75b is a rear view of the same coat ornamented with a design of *Wasko*, a mythological animal of the wolf species. The edges and arm-holes are bordered with red cloth, and the whole garment is neatly made. Fig. 80, Plate XXI, represents a buckskin coat, with the right side fringed and open and the left side sewed up, having an arm-hole for the left arm. The bottom is also fringed, and the neck-hole slit to admit the head. The design represents the bear. It is a Tlingit garment, loaned to the Museum by Mr. Max B. Richardson, of Oswego, New York. Other ceremonial coats are illustrated in the accompanying plates.

Ceremonial leggings.—These are of buckskin, blue cloth, blanket stuff, or of goat's wool, woven as shown in Plate x, Fig. 33a. A very common type is seen in Fig. 36, Plate x, fringed and ornamented with pendant beaks of the puffin, shown in the detail of the same figure. Other kinds are cut out in the pattern or outline of some totemic animal and either painted in design or worked on in colored cloth by the *appliqué* method. They are secured to the leg by straps of cloth or buckskin and are usually worn in conjunction with moccasins or the bare feet.



Fig. 75a.

CEREMONIAL SHIRT.

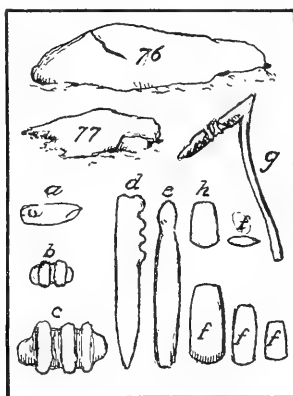
(Cat. No. 89194, U. S. N. M. Skidegate, B. C. Collect by James G. Swan.)



Fig. 75b.

REAR VIEW OF FIG. 75a.

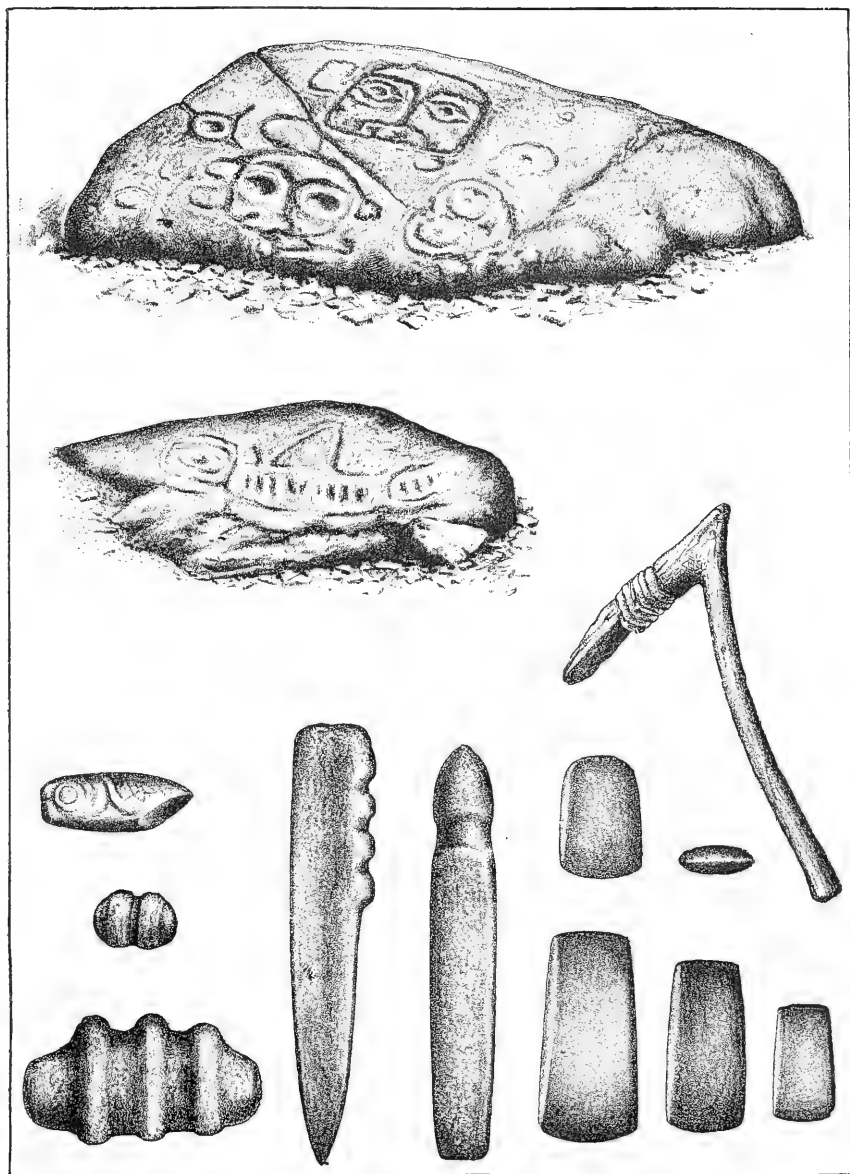
EXPLANATION OF PLATE XX.



CARVINGS ON ROCKS, AND STONE IMPLEMENTS FROM THE NORTHWEST COAST.

From photographs by the author.

- Fig. 76. ANCIENT TLINGIT SCULPTURES. Carved on the rocks on the beach near Fort Wrangell, Alaska. The figure represents the orca or whale-killer.
- Fig. 77. ANCIENT TLINGIT SCULPTURES. Representing several human faces and conventional designs.
- Fig. 79. PRIMITIVE STONE IMPLEMENTS. *a* is a scraper for removing the inner integument or bark from the trunk of the pine tree for food; *b* is a small stone hammer; *c*, a heavy stone sledge; *d*, an adze, of which *e* is a side view; *f*, a variety of stone adze blades (see Plate XXIII); *g*, a type of adze, showing method of hafting; *h*, a scraper used in the process of tanning hides. Haida Indians, Dixon Entrance. Collected by James G. Swan.



CARVINGS ON ROCKS, AND STONE IMPLEMENTS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XXI.

TLINGIT CEREMONIAL BUCKSKIN SHIRT.

Made of two thicknesses of buckskin, sewed up on the left side; open on the right. The neck-opening is slit to admit the head. The figure is painted on the front in black and red colors, and represents the totem of the Bear. Cat. No. 130588, U. S. N. M. Tlingit Indians, Alaska. Lent by Max. B. Richardson, of Oswego, N. Y.



TLINGIT CEREMONIAL BUCKSKIN SHIRT.

Slave-killers.—These are ceremonial implements formerly used by the chiefs in dispatching the slaves selected as victims of sacrifice on occasions of building a house, or on the death of a chief or other important personage, as described in Chapter XIII. Some varieties of these instruments are illustrated in Plate XLVI. The pointed ends were driven by a quick blow into the skull of the victim, whose body was accorded special consideration in burial. They seem in general to have been made of bone, or of wood tipped with stone. Naturally, with the advent of the whites, this custom has had to be abandoned, and these implements have, in time, become very rare.

V.

FOOD; IMPLEMENTS AND WEAPONS; HUNTING AND FISHING.

FOOD: ITS PREPARATION AND HOW OBTAINED.

Food.—Fish and berries form the staff of life amongst the Indians of this region. Around the summer camps, at all times, can be seen strips of halibut or salmon suspended in the smoke of the dwelling-houses, or drying in the open air on frames erected for the purpose. In the summer season there is an abundance of all kinds of food, but the energies of the Indians are directed to laying up a stock for winter's use. Halibut abound from March to November, and are readily caught on their favorite banks, known to the natives who camp near such localities. Halibut and salmon, fresh and dried, form the basis of the food supply. The salmon are caught during the "runs." After the daily wants are supplied, and a sufficient number dried for winter's use, the surplus fish are converted into oil. This oil, as well as all other kinds, is used as a sauce, into which nearly everything is dipped before eating. Seal and porpoise flesh, or blubber, is esteemed a great delicacy, although they will not eat whale's blubber for superstitious reasons. Any kind of meat of wild animals is eaten when procurable, but it is only in recent years that they have ever salted down or dried meat for winter's use. Other kinds of fish, such as cod, herring, and eulachon, are much esteemed. During the run of herring large quantities are dried or pressed into oil. Eulachon (*Thaleichthys pacificus*), the so-called "candle-fish," a kind of smelt, run in March and April at the mouth of the Skeena, Nass, and Stikine Rivers. These have the greatest proportion of fatty matter known in any fish. In frying they melt almost completely into oil, and need only the insertion of some kind of a wick to serve as a candle.

Fish roe.—The roe of fish is esteemed a great delicacy, and great care is taken to collect it in the water, or remove it from captured fish. It is either eaten fresh, or dried and preserved for winter's use, when it is eaten in two ways: (1) It is pounded between two stones, diluted with water, and beaten with wooden spoons into a creamy consistency; or (2) it is boiled with sorrel and different dried berries, and molded in wooden frames into cakes about 12 inches square and 1 inch thick.

Herbs and berries.—Roots, herbs, berries, and snails are amongst the luxuries of the summer season. Raspberries, salmon berries, strawberries, currants, red and blue huckleberries, salal, and thimbleberries abound late in the summer. Some of these are collected and dried for

winter's use, forming, with the dried fish, the principal winter's supply. Poole (1863) says of the Haida, that they often, through feasting or improvidence, eat up all the dried berries before spring, and "were it not for a few bulbs which they dig out of the soil in the early spring-time, while awaiting the halibut season, numbers of Indians really would starve to death."*

Portlock mentions the root of the wild lily as very much used by the Tlingit. Crab-apples are found, but are scarcely edible. Wild parsnips are abundant and palatable. Many years ago an American ship captain gave the Indians potatoes, and they are now regularly cultivated, and form a considerable item in the winter food supply. Other vegetables may be and are grown. Near all the villages now may be seen patches of ground planted, however, principally in potatoes.

Oil.—Fish is eaten dried by breaking it up and soaking the bits in fish-oil or grease, having the consistency of uncooled jelly. This oil is obtained from seals, porpoises, herring, salmon, eulachon, goat, deer, bear, and the livers of the dog-fish, shark, and other vertebrates. It is the odor of this rancid oil which permeates everything Indian, and renders a visit to a lodge on the northwest coast somewhat of an ordeal.

Invertebrates.—Invertebrates and several species of marine algae or sea-weed are eaten. Of the former there are clams, crabs, cuttle-fish, and mussels or oysters, the last named being often poisonous at certain seasons. The clams, echinoderms, and sea-weed are gathered at ebb tide. The shell fish are usually eaten in the winter months.

Sea-weed.—The sea-weed is dried for winter's use and pressed into a kind of cake, like plug tobacco. A species of it, quite black when dried, is used for making a dish called *sopallaly*, of which the Indians are immoderately fond. This is made by breaking up a very small piece of the pressed *sopallaly* cake into little bits in a bowl or dish and adding warm water. It is then beaten with a wooden spoon and sugar is added. It froths and foams like the white of an egg or like soap, and gradually turns from a terra-cotta color to white. Berries, fresh or dried, are sometimes added, and the mixture is consumed with avidity by old and young. Langsdorff (1805) says in spring and summer the Tlingit gather several sorts of sea-weed, which, "when cooked, make a bitterish sort of soup."†

He mentions also "a sort of square cake made of the bark of the spruce fir, pounded and mixed with the roots, berries and train oil."†

Bark.—The inner bark of the spruce and hemlock forms an important part of the food supply of the Haida, Tlingit, and Tsimshian. The southern Indian eats pine bark. Plate xx, Fig. 79a, shows a stone scraper used by the northern Indians for removing this inner bark from the trunk. The scrapings are molded into cakes about a foot square

* Poole, Queen Charlotte Islands, p. 315.

† Langsdorff, Voyages, Pt. II, p. 131.

and an inch thick, dried and preserved for winter's use. It is eaten, like dried fish, with oil as a sauce.

Birds.—The Indians are remarkably fond of wild fowl, but the difficulties of shooting and entrapping them with their ordinary implements and means have made them a very inconsiderable source of their food supply. At certain seasons, however, they capture them by strategy. Wild geese they catch after they have shed their large wing feathers and are unable to fly.* At other times they hunt wild fowl by night with torches and fell them with clubs. Poole (1864) thus describes bird slaughtering amongst the Kwakiutl:

The birds, which are small but plump, burrow their holes in the sand-banks on the shores. When the slaughtering season arrives the Indians prepare torches composed of long sticks having the tips smeared with gum taken from the pine trees. Armed with handy clubs, they then place these lighted torches at the mouths of the holes, and as soon as the birds, attracted by the glare, flutter forth, they fell them to the ground.†

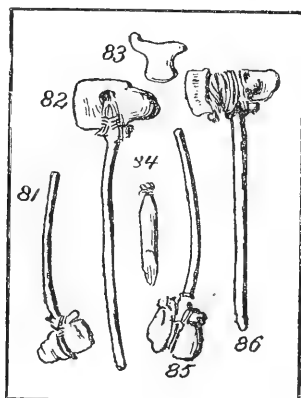
Birds' Eggs.—Birds' eggs are collected, wherever possible, in early summer. The Haida derive their supply from the outlying rocks of the Queen Charlotte Islands. The Kaigani make trips out to Forrester and other islands. Each location is pre-empted by particular families, and considered hereditary property, which is handed down from generation to generation.

Cooking and Preparation of Food.—Dried fish, bark, roe, etc., are eaten with grease or oil, as before stated. Salmon roe is buried in boxes on the beach, washed by the tide, and eaten in a decomposed state. The heads of salmon and halibut are esteemed a great luxury when putrefied in the tide or salt water. Meat is either broiled on a stick, roasted on hot stones, or boiled in a kettle. Before the introduction of kettles, meat was boiled in a wooden dish or water-tight basket by means of red hot stones added to the water. Fresh fish and cuttle fish are always cooked. Oil is extracted from the livers of dog-fish and stranded sharks and whales, to sell to the whites. Oil is obtained in different localities from salmon, herring, eulachon, and pollock. The fish is usually allowed to partially putrefy and then boiled in wooden boxes by means of hot stones dropped in the water. The grease or oil is skimmed from the surface. The refuse is squeezed in mats, and the grease obtained is stored in boxes. Sometimes this grease or oil is run into the hollow stalks of giant kelp, which have been tanned or prepared beforehand as follows: The stalks are soaked in fresh water to extract the salt, dried in the sun or in the smoke of the dwelling, and then toughened and made pliable with oil, rubbed thoroughly in. In this form of storage the oil is as portable as in bottles, or in jars, with less danger of breakage. Birds or wild fowls are toasted on a stick before a slow fire without any previous plucking or cleaning, and the feathers and skin removed afterward. The entrails are supposed to add a decidedly better flavor to the bird.

* Portlock, Voyage, p. 265.

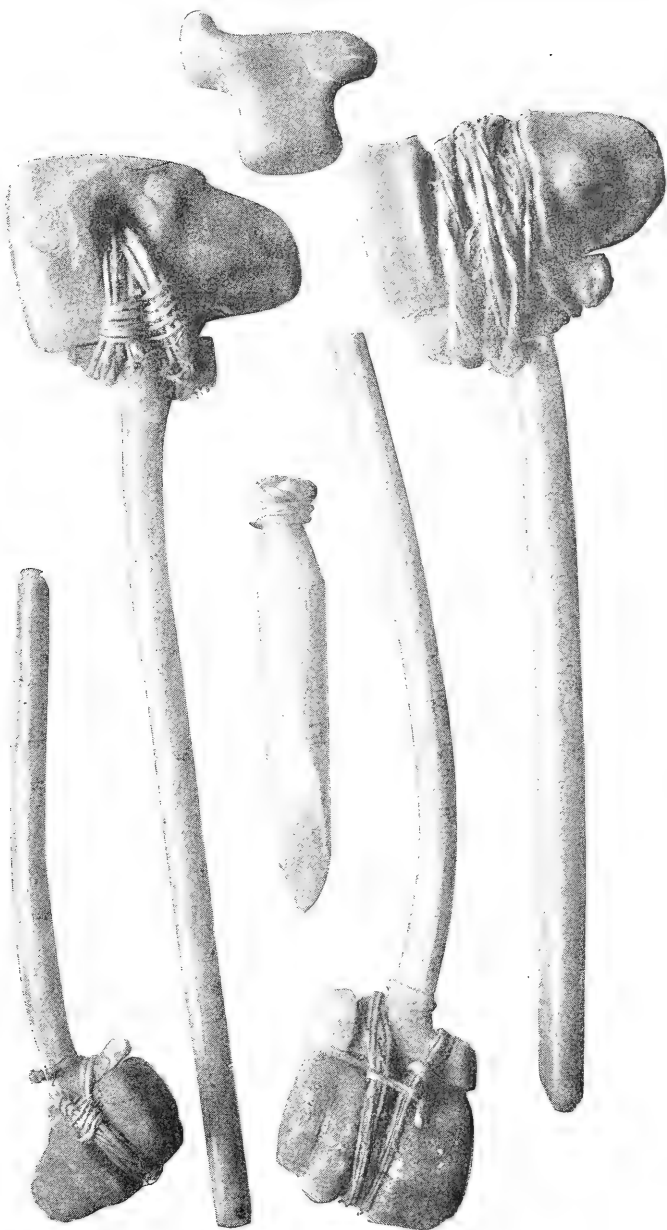
† Poole, Queen Charlotte Islands, p. 284.

EXPLANATION OF PLATE XXII.



PRIMITIVE STONE IMPLEMENTS FROM THE NORTHWEST COAST, WITH WOODEN WEDGE FOR SPLITTING WOOD.

- Fig. 81. **STONE HAMMER OR SLEDGE.** Head of basalt; haft of wood. The drawing shows method of hafting. Cat. No. 88820, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 82. **STONE SLEDGE.** Head of basalt; handle of wood; lashing of spruce root. Cat. No. 88815, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 83. **STONE PESTLE.** For grinding paint, and sometimes used as a hand weapon. Cat. No. 89011, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 84. **WOODEN WEDGE.** Body of spruce or cedar; lashing on the head of twisted spruce root. Used in splitting logs and getting out timber for industrial purposes. Cat. No. 72679, U. S. N. M. Makah Indians, Cape Flattery, Washington. Collected by James G. Swan.
- Fig. 85. **STONE SLEDGE.** Head of basalt; lashing of raw-hide. Cat. No. 20596, U. S. N. M. Kwakiutl Indians, Bella Bella, British Columbia. Collected by James G. Swan.
- Fig. 86. **STONE SLEDGE.** Head of basalt; lashing of spruce root. Cat. No. 20893, U. S. N. M. Kaigani Indians (Haida), Prince of Wales Island, Alaska. Collected by James G. Swan.



PRIMITIVE STONE IMPLEMENTS FROM THE NORTHWEST COAST, WITH WOODEN WEDGE FOR SPLITTING WOOD.

When the salmon or halibut are caught, it is the duty of the women to clean and dry them. The head is cut off, the fish slit down the back, back-bone and entrails removed, and the tail and fins cut off. The cleaned fish is then cut into long flakes, which are hung on a wooden frame, and cured, without salt, either in the sun or by means of a slow fire beneath. Sometimes they are dried in the smoke of the dwellings. The fish when dried are either wrapped in bark or stored in chests or boxes, and stowed for future use out of the reach of the dogs and children. When bear, deer, goats, or other game are killed, the skin is not generally removed from the carcass until most of the flesh has been eaten. In this way the skin forms a wrapper to preserve and protect the flesh. Grease obtained by boiling the meat is skimmed from the surface of the water and esteemed a great delicacy.

INDUSTRIAL IMPLEMENTS OR TOOLS.

In general.—Primitive tools were of stone, the most common edged ones being of flint, or a peculiar hard green jadeite, or, where possible to obtain it, of jade, which last named they got from the north in trade. Rough tools and implements, such as sledges, hammers, mortars, pestles, scrapers, etc., were of igneous rock, roughly carved in the totem of the owner. The knives for more delicate carvings in wood were of copper, flint, jade, or the bones of fishes and mammals, the work being smoothed down with shark skin used as a sand-paper. Steel has now been substituted for stone in all of their tools, but the native shape has been in a measure retained.

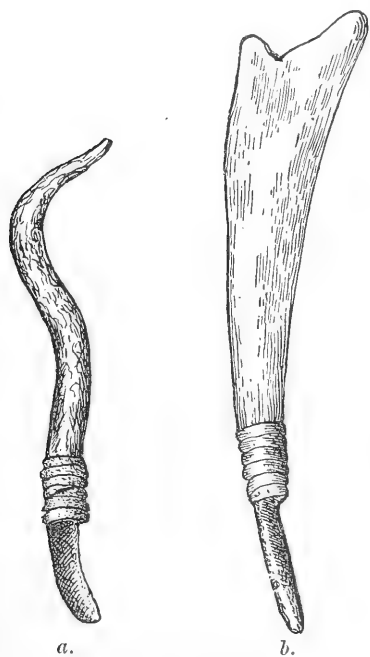
Hammers and Sledges.—These were of hard igneous stone, rudely carved, and are used here and there even to this day. Figs. 81, 82, 85, and 86, Plate XXII, represent a variety of these as regards shapes, sizes, and methods of hafting, while Plate XX, Figs. 79, *b* and *c*, show a very primitive form of hammer and sledge-head, respectively.

Adzes.—A variety of adz-blades of a green jade-like stone are shown in Fig. 79, same plate, *d*, *e*, and *f*. Figs. 88 and 89, Plate XXIII, are other varieties of this pick-shaped blade, of which Figs. 90 and 91 show methods of hafting. A more handy variety of adz, for finishing and planing work, is shown in Fig. 79 *g*, *f* being a variety of blades as regards size. The methods of hafting this flat-shaped blade throughout the northwest coast are shown in Fig. 79 *g* and Figs. 87, 92, 93, and 94, Plate XXIII. Iron or steel is now substituted for stone, and the favorite form is that made by sharpening the end of a broad flat file. Dixon (1787) says the only stone implement he saw amongst the Tlingit and Haida was an adze made of jasper, "the same as those used by the New Zealanders."*

Knives.—Before the introduction of iron the only metal available was copper. This was not used for industrial purposes, as knives, on ac-

* Dixon, Voyage, p. 224.

count of its softness. Chief reliance was placed in jade, flint, or other stone, and upon shells and bone. In the Emmons Collection in the Museum of Natural History in New York are two primitive Tlingit stone knives, with horn handles, and illustrated in Figs. 99 *a* and 99 *b*. The handles are of deer horn, the blades of jade, and the lashing of buckskin. Marchand (1791) expressed his astonishment at the elaborately carved posts in front of the



Figs. 99*a* and 99*b*.
STONE BLADED KNIVES.
(Haida. Emmons Collection.)

Haida houses of Queen Charlotte Islands, which, he says, were fashioned out with "a sharp stone, hafted on a branch of a tree, the bone of a quadruped, the bone of one fish and the rough skin of another."* On the introduction of iron, which both Cook and Dixon attribute to the Russians, the Indians were not slow to adapt it to their purposes. Dixon says that in Captain Cook's time "iron implements were then also in use" among the Tlingit and Haida, while, in 1787, their knives were "so very thin that they bend them into a variety of forms, which answer their every purpose nearly as well as if they had recourse to a carpenter's tool chest."† This applies, however, equally well to-day, as Plate XXIV will show. Figs. 97 to 103, inclusive, illustrate a variety of knives from the northwest coast, all of similar design or pattern, those from the north, however,

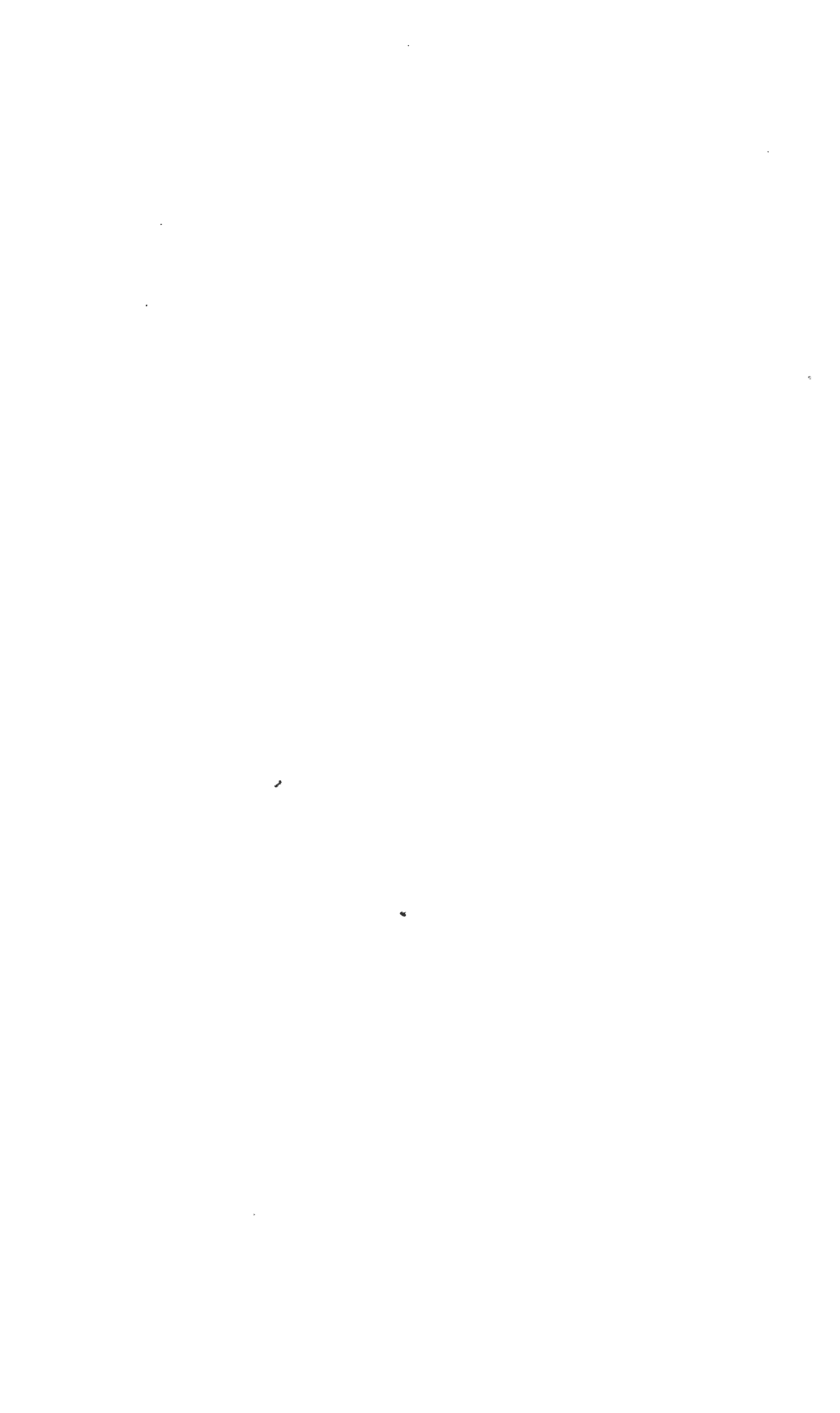
having their handles carved with totemic designs after the usual custom of this region. Figs. 95 and 96 represent fish knives of a simple pattern, which replaced those of shell formerly used. Fig. 103 represents a pattern not uncommon in the north, being, besides a dagger, an all around knife for carving, cleaning fish, cutting up game, etc., much as a bowie knife is used by the trapper of the interior.

Scrapers.—Two varieties of stone scrapers are shown in Plate XX, Fig. 79*a* and *b*. The former is a very primitive instrument used for scraping off the inner bark of the spruce and hemlock for food. The latter is a stoneskin scraper used in cleaning hides in the process of tanning. These are also of bone, as shown in Fig. 79*k* from the Emmons collection, and are often ornamented with totemic designs, as in the specimen shown.

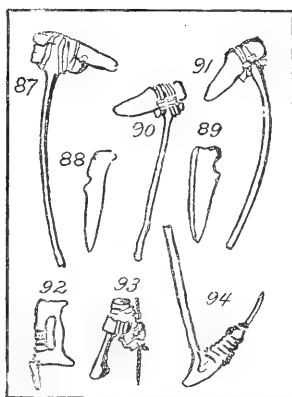
Mortars and pestles.—Stowed away in the older houses of the different

* Quoted by J. G. Swan, in *Smithson. Cont. to Knowledge*, 267, p. 12.

† Dixon, *Voyage*, p. 243.

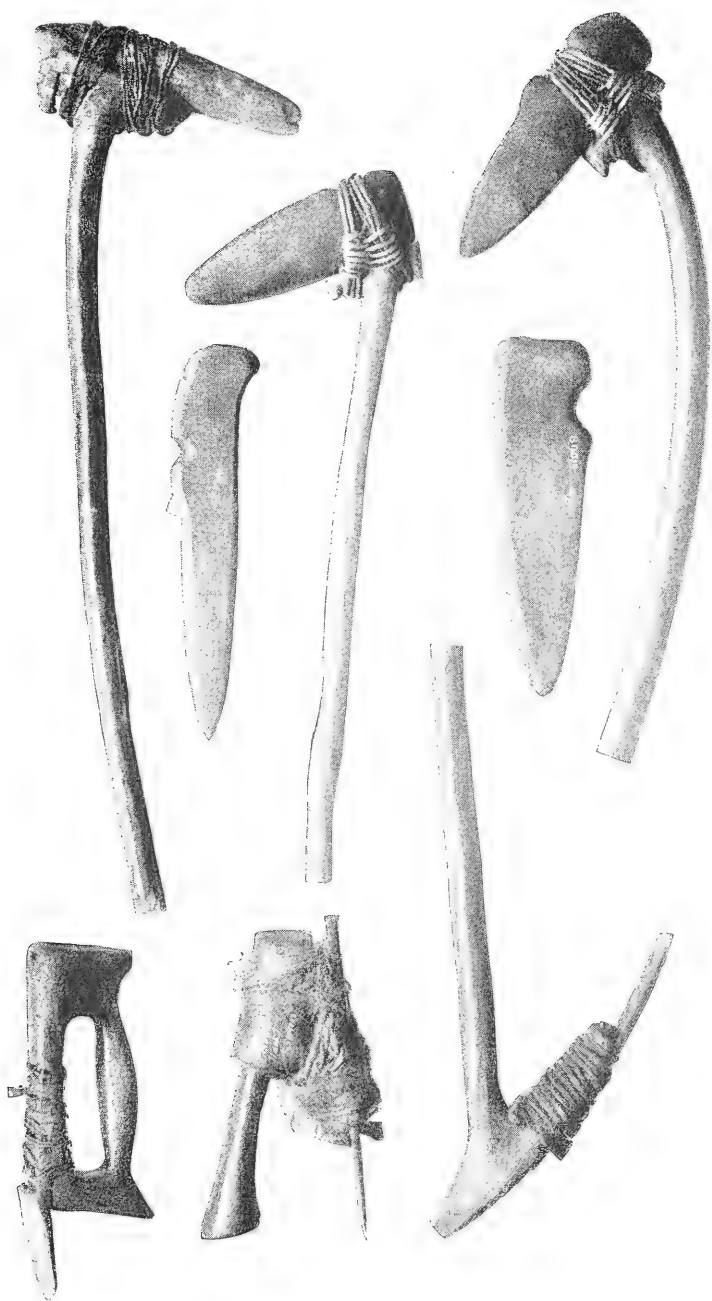


EXPLANATION OF PLATE XXIII.



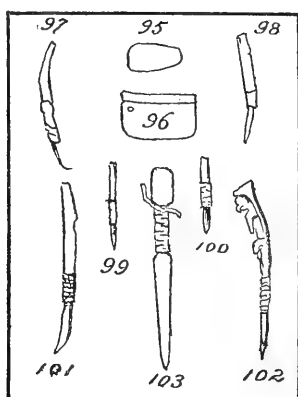
PRIMITIVE STONE AND STEEL IMPLEMENTS FROM THE NORTHWEST COAST.

- Fig. 87. STONE ADZE. Rudest form; showing mode of hafting. See Plate XX, 79*f*. Cat. No. 43234, U. S. N. M. Tlingit, Alaska. Collected by Commander Beardslee, U. S. Navy.
- Fig. 88. STONE ADZE BLADE. Hafting shown in Fig. 91. Cat. No. 88996, U. S. N. M. Tsimshian Indians, Fort Simpson, British Columbia. Collected by James G. Swan.
- Fig. 89. Same as Fig. 88. Cat. No. 89013, U. S. N. M.
- Fig. 90. STONE ADZE. With lashing of twisted spruce root. See also Plate XX, Fig. 79, *d* and *e*. Cat. No. 88816, U. S. N. M. Masset Indians (Haida), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 91. Same as Fig. 90. Cat. No. 88720, U. S. N. M.
- Fig. 92. HAND ADZE. Blade of steel; handle of bone. Cat. No. 23376, U. S. N. M. Makah Indians (Wakashan stock), Cape Flattery, Washington. Collected by James G. Swan.
- Fig. 93. ADZE. Blade of steel. Cat. No. 23462, U. S. N. M. Clallam Indians (Salishan stock), Washington. Collected by James G. Swan.
- Fig. 94. ADZE. Blade of steel; general northwest type. Hafting same as used formerly on stone blades. See Plate XX, Fig. 79*f*. Kwakiutl Indians, Bella Bella, British Columbia. Collected by James G. Swan.



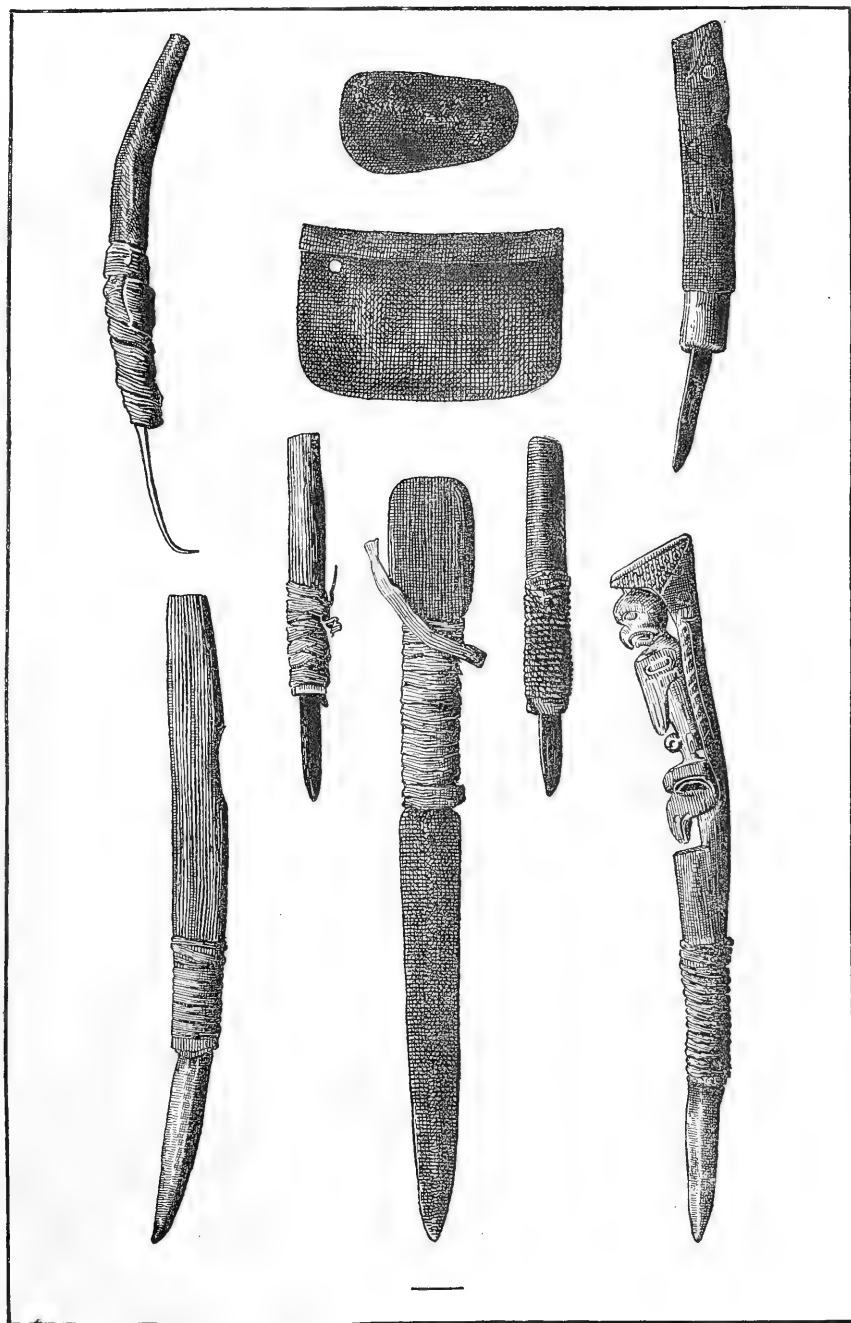
PRIMITIVE STONE AND STEEL IMPLEMENTS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XXIV.



INDUSTRIAL IMPLEMENTS OR TOOLS—KNIVES FROM THE NORTHWEST COAST.

- Fig. 95. FISH KNIFE. Steel. Used in cleaning and preparing fish for drying. Cat. No. 74373, U. S. N. M. Tlingit, Sitka, Alaska. Collected by John J. McLean.
- Fig. 96. FISH KNIFE. Steel, with copper handle. Cat. No. 88772, U. S. N. M. Haida Indians, Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 97. WOOD-CARVING KNIFE. Blade of steel. The end of the blade is curved to make the deep cuts of relief-carving. Cat. No. 129977a, U. S. N. M. Kwakiutl Indians, Fort Rupert, Vancouver Island, British Columbia. Collected by James G. Swan.
- Fig. 98. WOOD-CARVING KNIFE. Straight blade of steel; handle carved to represent a sea-lion. Cat. No. 129977b, U. S. N. M. Kwakiutl Indians, Fort Rupert, Vancouver Island British Columbia. Collected by James G. Swan.
- Fig. 99. WOOD-CARVING KNIFE. Cat. No. 129978a, U. S. N. M. Kwakiutl Indians, Fort Rupert, Vancouver Island, British Columbia. Collected by James G. Swan.
- Fig. 100. WOOD-CARVING KNIFE. Cat. No. 129978b, U. S. N. M. Kwakiutl Indians, Fort Rupert, Vancouver Island, British Columbia. Collected by James G. Swan.
- Fig. 101. WOOD-CARVING KNIFE. Curved end of blade. Cat. No. 20831, U. S. N. M. Kaigani Indians. Prince of Wales Island, Alaska. Collected by James G. Swan.
- Fig. 102. WOOD-CARVING KNIFE. Carving represents Hooyeh, the raven. Cat. No. 67831, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 103. KNIFE. Used as a weapon and for carving wood, cutting up meat, fish, etc. Cat. No. 74267, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.



INDUSTRIAL IMPLEMENTS OR TOOLS—KNIVES FROM THE NORTHWEST COAST.

villages are now found large and small stone mortars and pestles, surprisingly well carved in totemic designs.

These were by some people supposed to indicate that in early days these Indians ground maize, as did and do the hunting Indians of the interior, but such is not the case, as they were unacquainted with cereals of any kind. These mortars were used for an entirely different purpose. In the larger ones were ground and prepared the tobacco plug for chewing; in the smaller were mixed and ground the different paints used for the body, masks, carvings, and all the various purposes to which these native pigments were and are now applied. Fig. 83, Plate XXII, represents a paint-pestle, which was also used as a weapon or missile, carried in the hand in times of local feuds, brawls, and quarrels. Fig. 83a represents a pestle of this kind in the Emmons Collection already referred to. Another variety of pestle is shown in Plate LXIII, Fig. 338. Fig. 339 of same plate is an ancient tobacco mortar of marble or calcite, neatly carved on the exterior with a totemic design. Other mortars carved in likeness of frogs, birds, fishes, and flower-pots are found throughout the northern region.

Wedges.—These are usually of wood and formerly were entirely so. Now, however, iron wedges are sometimes used. These, in any case, are for splitting up logs into boards, and in getting out timber in the rough generally. A very useful type of wooden wedge is shown in Fig. 84, Plate XXII, general throughout the coast. These were used in connection with the heavy sledges shown in the same plate. The heads of the



Fig. 79k.

BONE SKIN SCRAPER.
(Tlingit. Emmons Collection.)

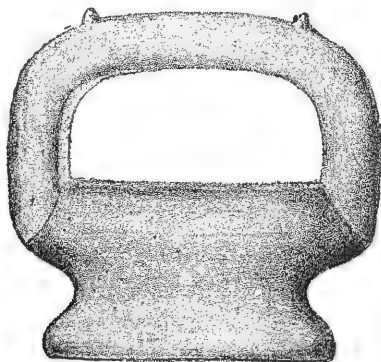


Fig. 83a.

PAINT PESTLE.

(Tlingit. Emmons Collection.)

wedges are protected, or prevented from splitting, by a grommet woven from tough withes or from spruce root and put on as shown in the

illustration. The skill with which huge slabs, rafters, and boards are gotten out with the rough tools employed is surprising.

Chisels.—A primitive type of chisel is shown in Fig. 78, consisting of a green stone blade mounted in a wooden handle. The blade is similar in shape to those of the adzes. This instrument was used in roughing down the surface, the smoothing being done by scraping with sharp-edged shells or stones, or even by rubbing with shark or dog-fish skin to get a finished surface.



Fig. 78.

CHISEL.

(Emmons Collection.)

Drills.—Holes, where drilled, were made by patient digging with a pointed instrument of stone or bone, or by driving in a copper spike and withdrawing it. Joints were made by dovetailing, mortising, tonguing and grooving, or notching and lashing, great ingenuity being shown in avoiding the necessity for pegs or nails.

Paint-brushes.—These are shown in all their varieties in Plate XLV, A and B, and are well adapted to the neat work demanded of them. Bristles, hair, and vegetable fiber are the materials used for the brush-heads. The handles of those from the northern region are carved with the usual totemic designs.

Other tools and implements adapted to special uses in their arts and industries will be described in Chapter VII.

WEAPONS OF WAR AND OF THE CHASE.

Weapons.—The principal weapons before the advent of the whites were clubs of wood and stone, bows and arrows, spears with shell, bone, flint, copper, or jade tips, and, above all, the dagger, the constant companion of the Indian of this region.

Clubs.—These were of wood, of stone, or of stone hafted with wood. The hafted stone clubs were simply industrial implements already described and used for the time being as weapons. A Tsimshian stone war-club is illustrated in Fig. 122, Plate XXVII. A Tlingit stone war-club in the Emmons Collection, New York, is shown in Fig. 119a. It is possible that the slave-killers, shown in Plate XLVI, were also carried as weapons, although no war-clubs of this type are now found in this region. Plate XXVIII illustrates a variety of clubs used for different purposes. Fig. 132 is a war-club pure and simple, the others being hunting or fishing implements and used to give the death-blow to seals, sea-otters, or fish after their capture by the different methods explained hereafter. These are all carved either with the totemic design of the owner or a representation of the animal itself. Each club is used distinctly for the purpose of dispatch-

ing the animal for which it was made. Figs. 128 and 129 are sea-otter clubs; Figs. 130 and 131 are seal clubs. The halibut and other fish clubs are similar in design. A type not here illustrated is a round wooden knob with straight handle.

Daggers.—Dixon (1787) says of the Haida and Tlingit:

Their weapons are spears fixed to a pole 6 or 8 feet long, and a kind of short dagger, which is worn in a leather case, and tied round the body; to this dagger a leather thong is fastened, at the end of which is a hole for the middle finger; the leather is afterwards twisted round the wrist in order to fix the dagger firm in the hand, so that the warrior loses his weapon only with his life.*

The handle is generally nearer one end than the other, giving a long blade and a short one. The leather sheath is usually strapped to the waist or hung about the neck, concealed beneath the blanket. The handle is small in diameter, wrapped with leather, and secured by a thong to the wrist when carried in the hand. The blades are flat and thicker down the middle than towards the edges, being generally grooved on each side of the center ridge. All varieties of patterns, however, are found, the different types being well represented in Plate XXV, of which Fig. 108 represents a primitive dagger of copper inlaid with haliotis shell, while Fig. 107 is the same type, of steel, with copper mountings. Fig. 107*d* is a sheath of buckskin for the short blade of the dagger, and 107*e* the same for the long blade, the latter having, as shown, a strap to go about the neck. The dagger shown in Fig. 107 is from the Copper River Indians, but is clearly a Tlingit type, having undoubtedly reached that region in the course of trade. Fig. 106 shows a one-bladed dagger with a carved handle. Fig. 104, with its three details, *a*, *b*, and *c*, shows the method of securing the handle to the blade. Fig. 105 is a Tlingit chief's dagger. The edges of all of them are rather dull and the points somewhat blunt, but the execution which these deadly weapons do is in the force with which they are driven into an

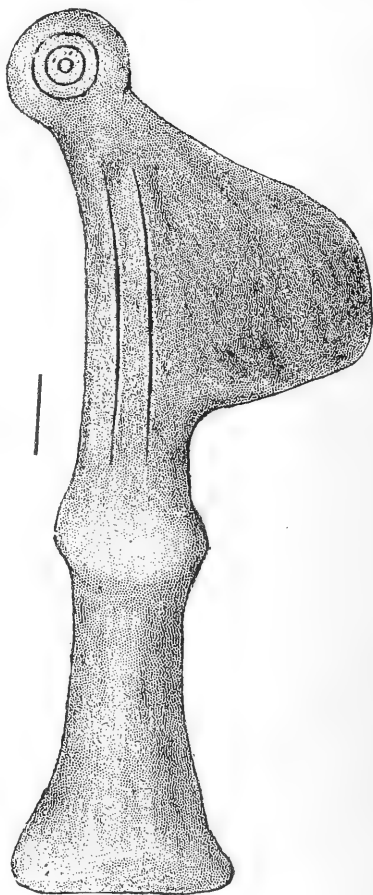


Fig. 122a.

STONE WAR-CLUB.

(Tlingit. Emmons Collection.)

* Dixon, Voyage, p. 244.

adversary. The two primitive types of copper daggers seen by Dixon (1787) in this region are reproduced from sketches in his Voyage, p. 188, in Plate xxvii, Figs. 116 and 117. Amongst the Aleut and Tinné to



Fig. 108b.

STONE DAGGER.

(Tlingit. Emmons Collection.)

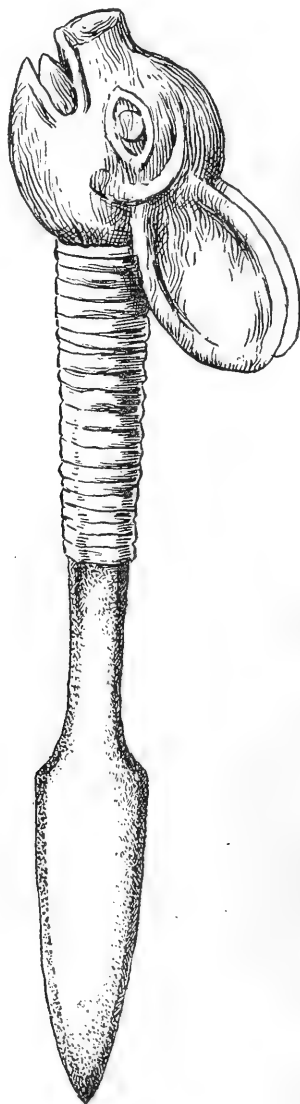


Fig. 108c.

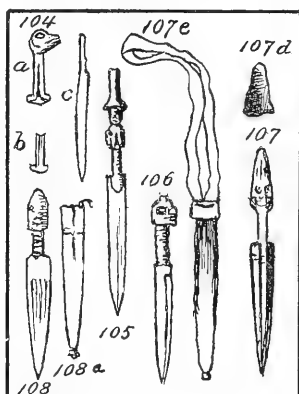
STONE-BLADED DAGGER.

(Tlingit. Emmons Collection.)

the north the type of dagger is that shown in Fig. 118, described also by Portlock (1787)*. This type is found in the Yukon region and well

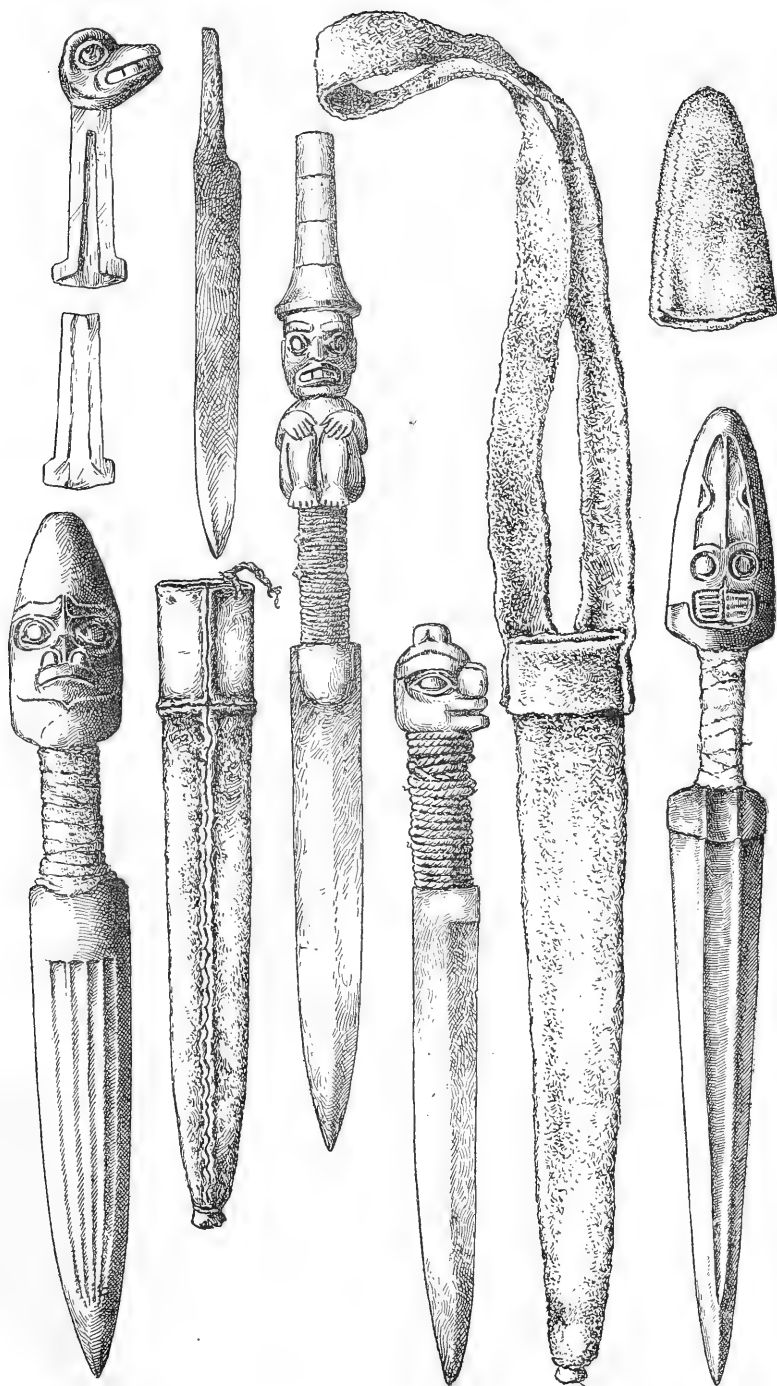
* Portlock, Voyage, p. 261.

EXPLANATION OF PLATE XXV.

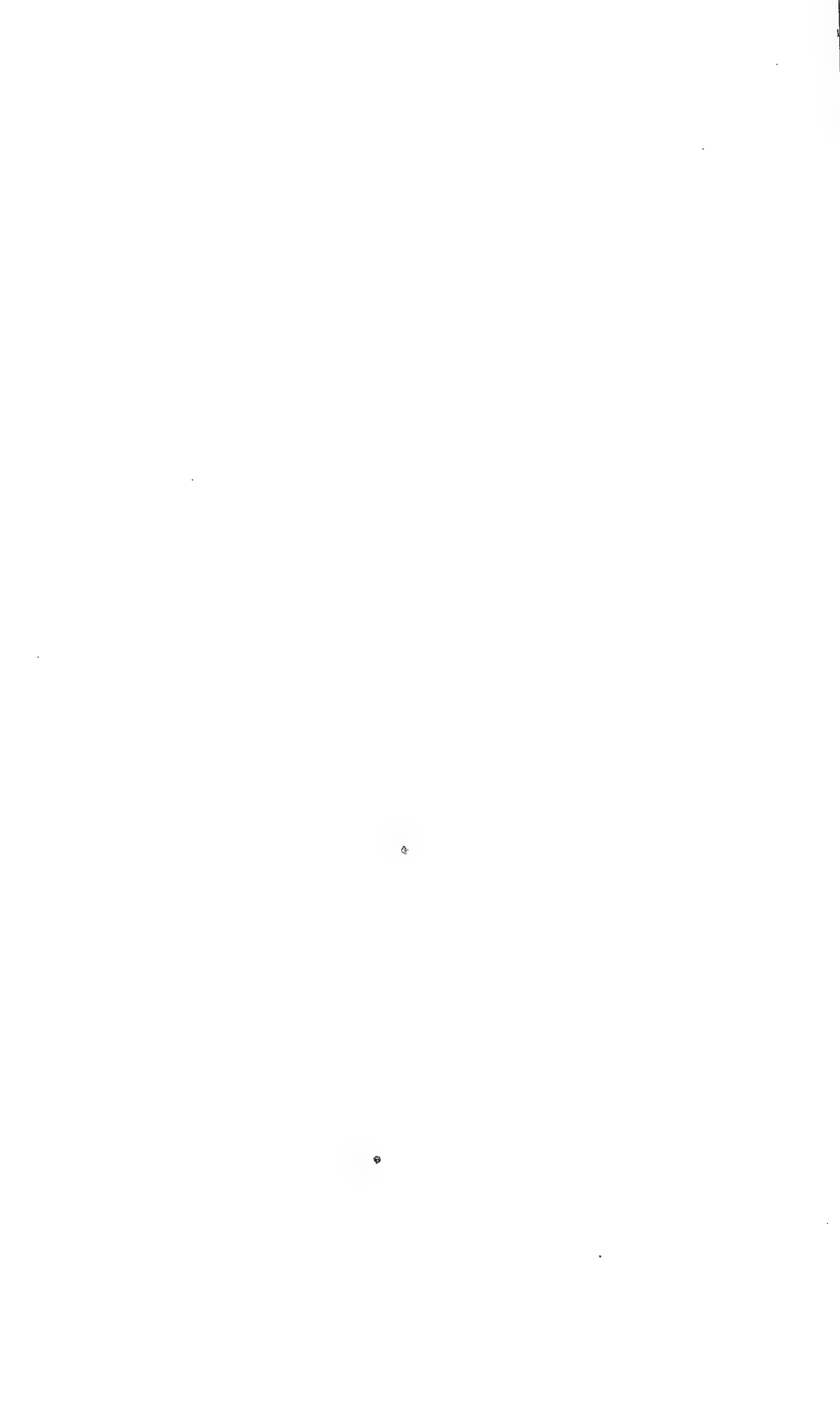


COPPER AND STEEL DAGGERS WITH SHEATHS OF BUCKSKIN AND MOOSE HIDE.

- Fig. 104. DAGGER. Steel blade; cedar-wood handle, showing method of attachment. Cat. No. 74264, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 105. DAGGER. Steel blade; carved wooden handle, representing an Indian chief sitting. (Sheath of moose hide to the left.) Cat. No. 74262, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 106. DAGGER. Steel blade; carved cedar-wood handle. Cat. No. 76463, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by James G. Swan.
- Fig. 107. DOUBLE-BLADED DAGGER. With copper mountings; Tlingit type. Probably acquired by Copper River Indians through trade. Fig. 107e is buckskin sheath with neck-strap. Fig. 107d is the sheath for the short blade. Cat. No. 88702, U. S. N. M. Athapaskan stock, Alaska. Collected by James G. Swan.
- Fig. 108. DAGGER. Of copper; double-headed; primitive type; elaborately chased and inlaid with abalone shell. Cat. No. 89020, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



COPPER AND STEEL DAGGERS WITH SHEATHS OF BUCKSKIN AND MOOSE HIDE.

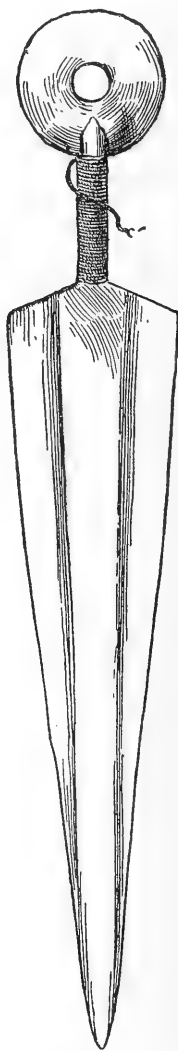


back into the interior. Fig. 116 is a slight modification in the type of 117, in the direction of 118. The first daggers that were made of steel, after the advent of the whites, were converted by the natives from large flat files, which they also made into adze blades. The skillful manner in which the Indians ground down the files into beautifully fluted daggers challenged the admiration of the traders, who found the work as skillfully done as that by European metalworkers. The primitive dagger was of stone or bone. Those of bone were of the shape shown in Fig. 107, Plate XXV, with a sharp ridge running down the middle. Fig. 108*b* represents a Tlingit stone dagger from the Emmons Collection Fig. 108*c* from the same source, has a blade of stone and handle of wood covered in totemic design. Another dagger of jadeite or nephrite, not here represented, is a long prism of square cross-section pointed at each end, about three-fourths inch on a side, with the handle about one-third of the distance from one end. Fig. 108*d* is a steel dagger, also from this collection, of native workmanship. The edges are very sharp, and it is an exceedingly dangerous weapon. The handle is covered with plate copper, as shown. Fig. 108*e* is a Tlingit steel dagger also from the Emmons Collection. The handle is wrapped with buckskin strips, and outside of all is wound a cord of plaited human hair. Fig. 108*f* is a Tlingit ivory guard for the point of a dagger to protect the wearer from danger of accidental stabbing. Fig. 180*g* is an ivory dagger-edge guard for fastening over the sharp edged point of a dagger. Both of

Fig. 108*d*.

STEEL DAGGER.

(Tlingit. Emmons Collection.)

Fig. 108*e*.

STEEL DAGGER.

(Tlingit. Emmons Collection.)

these specimens are from the Emmons Collection. Fig. 108*h* is a steel-bladed dagger with goat-horn handle.

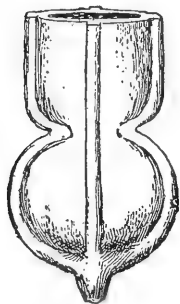


Fig. 108*f*.

IVORY GUARD FOR DAGGER POINT.

(Tlingits. Emmons Collection.)



Fig. 108*g*.

IVORY GUARD FOR DAGGER.

(Tlingit. Emmons Collection.)

Bows and arrows.—In the course of trade many of the Eskimo types of bows and arrows have found their way south amongst the Indians, particularly amongst the Yakutat and other northern Tlingit. With the Eskimo and Aleut the bow and arrow is, equally with the

harpoon, a weapon of the greatest importance, and a high type of each has been developed. The backing of sinew on the bow is occasionally found amongst the Tlingit, but not so skillfully applied as in the north (see Smithsonian Report, 1884, "A Study of the Eskimo Bows in the U. S. National Museum," by Mr. John Murdoch). Amongst the Indians of the northwest coast the bow and arrow is and always has been only an auxiliary hunting implement, although a very important one, in the capture of sea-otter. To-day the bow and arrow survives only as a means of despatching wounded game to save powder and ball. The two types of coast Indian bows, the broad and narrow, are shown in Plate XXVI. The narrow type (Figs. 109, 110, and 115) is principally confined to the Tlingit, whereas the broader one (Figs. 111, 112, and 114) is found amongst not only the Tlingit, but the Haida and Tlingit as well. In Fig. 112 the peculiar groove down the inside of the bow is shown. The device in Fig. 115 to protect the thumb from the snap of the bow-string consists of a wooden bridge lashed to the inner side of the bow at the middle. This is a willow bow of the type found in the interior amongst the Tinne, and either copied from their type or obtained by trade from them. Cedar and yew are the principal woods used by the coast Indians for bows, the strings being of hide or sinew. Few bows are now seen amongst these Indians except as toys for the children.

Arrows.—Before the introduction of iron, arrow-heads were of bone, flint, shell, or copper. The copper and later iron heads were of the shape shown in Fig. 133*a* or 134*a*, Plate XXIX, fitting into an ivory or

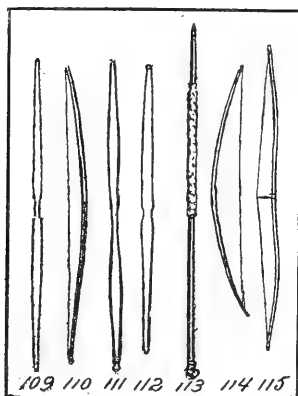


Fig. 108*h*.

STEEL-BLADED DAGGER.

(Tlingit. Emmons Collection.)

EXPLANATION OF PLATE XXVI.



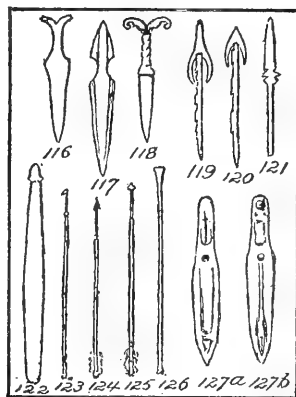
TLINGIT AND HAIDA BOWS AND TLINGIT WAR-SPEAR.

- Fig. 109. Bow. Tlingit type; narrow. Cat. No. 75454, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.
- Fig. 110. Bow. Narrow type. Cat. No. 16406, U. S. N. M. Yakutat Indians (Tlingit), Alaska. Collected by William H. Dall.
- Fig. 111. Bow. General coast-type. Cat. No. 63551, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 112. Bow. General broad coast-type; under side showing the groove. Cat. No. 73546, U. S. N. M. Kaigani Indians (Haida), Queen Charlotte Islands, British Columbia. Collected by J. Loomis Gould.
- Fig. 113. WAR SPEAR. General type after introduction of iron. Handle carved with owner's totem. Blade of steel (bayonet shape). Cat. No. 75419, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 114. BROAD BOW. General coast type. Compare 111, 112. Cat. No. 88812, U. S. N. M. Masset (Haida), Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 115. WILLOW BOW. With device for receiving the blow of the string. Cat. No. 75455, U. S. N. M. Tinné Indians, interior of Alaska. Collected by John J. McLean in Sitka.



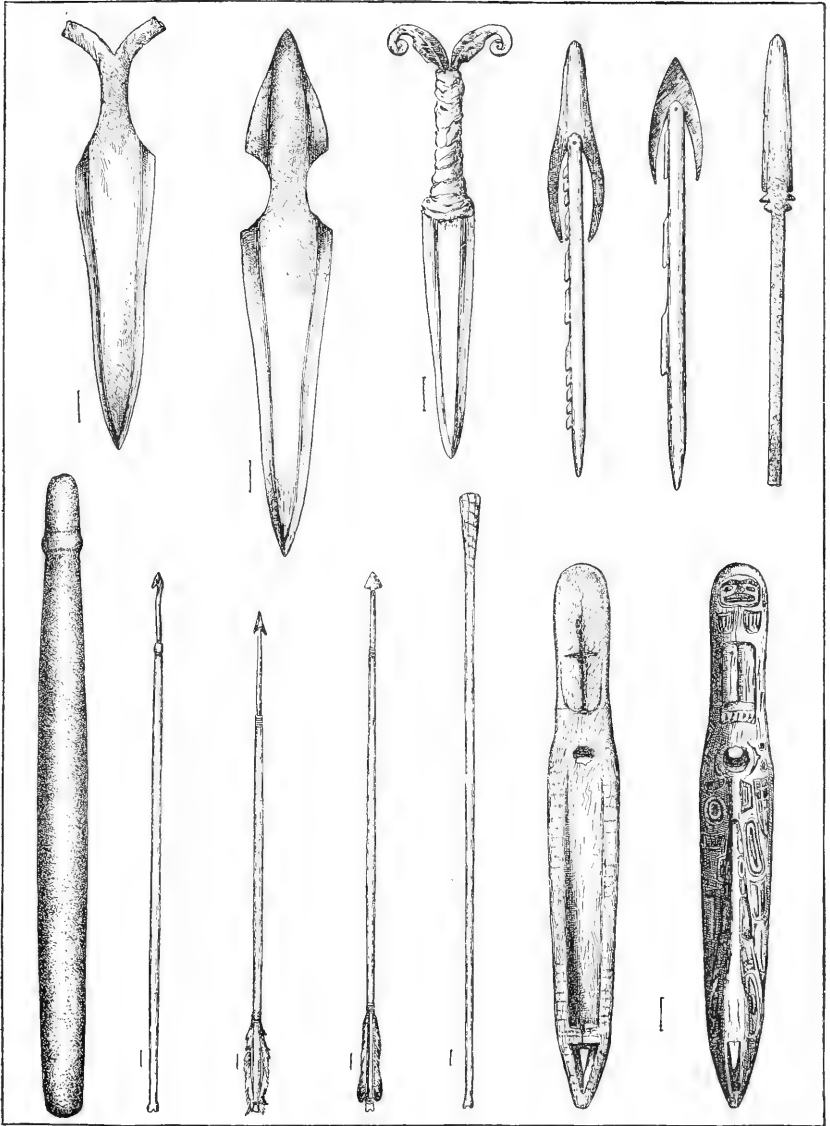
Tlingit and Haida Bows and Tlingit War-Spear.

EXPLANATION OF PLATE XXVII.



WEAPONS OF WAR AND OF THE CHASE.

- Figs. 116 and 117. COPPER DAGGERS. From Dixon's Voyage, page 188.
- Fig. 118. STEEL DAGGER. Cat. No. 2025, U. S. N. M. Arctic coast and Yukon River. Collected by B. R. Ross.
- Fig. 119. STEEL ARROW-HEAD. Foreshaft of bone. Cat. No. 74960, U. S. N. M. Tlingit, Alaska. Collected by John J. McLean.
- Fig. 120. STEEL ARROW-HEAD. Bone foreshaft. Cat. No. 74958, U. S. N. M. Tlingit, Alaska. Collected by John J. McLean.
- Fig. 121. STEEL ARROW-HEAD AND FORESHAFT. Cat. No. 74966. Tlingit, Alaska. Collected by John J. McLean.
- Fig. 122. STONE WAR CLUB. Tsimshian, Fort Simpson, Alaska. From photograph.
- Fig. 123. ARROW. Shaft of cedar; steel head and foreshaft in one piece. Cat. No. 73457, U. S. N. M. Kaigani, Prince of Wales Island, Alaska. Collected by J. Loomis Gould.
- Fig. 124. ARROW. Shaft of cedar; bone head and wooden foreshaft. Feathers attached to the shaft at their extremities. Cat. No. 20694, U. S. N. M. Bilqula Indians, British Columbia. Collected by James G. Swan.
- Fig. 125. ARROW. Head of shell; feathering glued to the shaft. Cat. No. 20694, U. S. N. M. Bilqula Indians, British Columbia. Collected by James G. Swan.
- Fig. 126. BLUNT ARROW. Of cedar; for practice and dispatching game. Cat. No. 63551, U. S. N. M. Tlingit, Sitka. Collected by John J. McLean.
- Fig. 127 (a and b). THROWING-STICK. Of wood; carved in totemic designs and inlaid with haliotis shell. Cat. No. 7899, U. S. N. M. Tlingit, Sitka. Collected by Dr. T. T. Minor, U. S. Army. The Tlingit are not known to have used the throwing-stick, while it occurs throughout the entire Eskimo area. (See Smithsonian Report, 1884, Part II, legend to Plate XVII.)



WEAPONS OF WAR AND OF THE CHASE.

bone fore-shaft, the shaft being of cedar. In some varieties the barbs are on one side only. Fig. 124, Plate XXVII, represents a bone-headed arrow. Figs. 135 and 136, Plate XXIX, are bone spear-heads, but the same shape of smaller size are used for arrows. These are set into a bone or ivory fore shaft similar to the Eskimo arrows. Fig. 125 represents an arrow with a head made of shell. The fore-shafts are of light cedar wood let into the larger shafts. In the Emmons Collection is a black flint arrow-head represented as coming from this region. The style of blunt-headed arrow is shown in Fig. 126. These are generally used for despatching wounded game. Fig. 126*a* shows one variety of bone arrow-head of this blunt pattern. The tenon at the butt fits into

Fig. 126*a*.

BONE ARROW-HEAD.

(Tlingit. Emmons Collection.)

Fig. 126*b*.

BONE ARROW-HEAD.

(Tlingit Indians. Emmons Collection.)

Fig. 126*c*.

BONE ARROW-HEAD.

(Tlingit Indians. Emmons Collection.)

a socket either in the bone fore-shaft or in the cedar shaft itself. Fig. 126*b* shows another kind, in which the shaft fits into the head itself, where it is secured by means of a tight lashing of twisted bark, cord, or sinew. Fig. 126*c* shows a third variety, in which a thin tongue or projection on the side of the bone arrow-head lets into a groove on the side of the shaft. Through holes pierced in this tongue and through the head of the arrow-shaft wires are run to attach the head to the shaft. The general types of iron arrow-heads are shown in Figs. 119, 120, 121, and 123, Plate XXVII, and 133*a*, 134*a*, and 138, Plate XXIX. The fore-shafts of 119 and 120 are of bone. Arrows with bone fore-shafts, or bone or ivory sockets on the head of the arrow-shafts, and with detachable heads similar to those used by the Eskimo, are occasionally found amongst the Tlingit. The arrows of the southern Indians are in general superior to those of the northern, and of the interior Indians to those on the coast.

War spears.—The primitive form was a simple wooden pole sharpened and hardened in the fire, or pointed with copper and later with iron.*

* Bodega y Quadra, quoted in Bancroft, *Native Races*, Vol. I, p. 104.

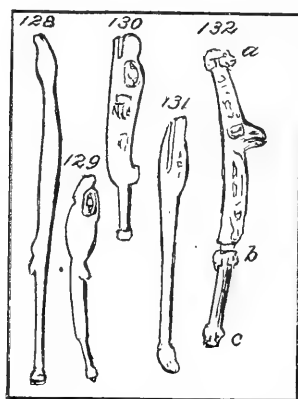
Not many stone spear heads are found in this region. There is one in the Emmons Collection in New York, but how it was attached to the spear shaft does not appear. Marchand (1793) describes the war spear as consisting of two parts, a wooden shaft and an iron head, shaped like a Swiss halberd.* Plate XVII, Fig. 64, shows a wooden ceremonial spear, doubtless an imitation of an ancient form of copper or stone-headed spear. Fig. 113, Plate XXVI, is a Sitka war spear with carved handle or shaft and steel bayonet pointed head. In general the war spears have shafts from 10 to 14 feet long, whereas the hunting spears are much shorter.

Fur-seal spear.—This in general consists of a long, light cedar shaft and a detachable head. The shaft is of the primitive type with a socket in the upper end to receive the butt end of the detachable head. This latter was formerly made of bone but later and at present of iron or steel. (Plate XXIX, Figs. 133*a*, 134*a*, 135 and 136.) The steel ones are generally made by the Haida themselves from old flat files which they purchase from the traders. The end is sharply pointed, as shown in the figure, while the edges and back are wrought into sharp barbs to hold in the flesh. A loop of wire, or a shackle near the butt end, serves for the attachment of one end of a strong cord of plaited sinew, sea-weed, or vegetable fibre, the other end being secured to a float or bladder. This spear is nothing more nor less than a harpoon. The seal being struck, the head detaches itself and the animal is thus secured to one end of a line. When not in use, the head is carried in a sheath made of two pieces of cedar wood in the shape of a fish's tail, securely lashed together with bark or spruce root lashings. (Figs. 133*b* and 134*b*.) When about to be used, the sheath is removed and the detachable head fixed in the socket of the light cedar shaft. Figs. 135 and 136 represent detachable spear heads of bone, with barbed edges. The cross sections *c* and *d* show that one is lenticular in shape and the other triangular. This type of spear head is not unlike that of the Eskimo and Aleut and is of very primitive design. Arrow-heads of this shape and description are common amongst the Eskimo but are rare in the coast Indian region. The fur-seal spears here described are virtually harpoons.

Salmon spears.—Primitive types of salmon spear heads are shown in Figs. 137 and 138, Plate XXIX. The shafts are now, as always, of light cedar wood, the recent changes in the character of the spears being due to the substitution of large steel fish hooks for spear heads. These hooks, purchased from the traders, are lashed to the spear shaft near the end, as shown in Fig. 149, Plate XXX, and the old-fashioned spear head done away with altogether. This is a very effective spear, and in the Indian's hands seldom fails to bring up its victim. Fig. 137*e* is a bone salmon spear head from the Emmons collection. Fig. 149*a* is a Tlingit salmon gig of deer antler for snagging salmon, also from the

* Marchand, Voyage, tom. II, p. 68, also quoted by Bancroft.

EXPLANATION OF PLATE XXVIII.



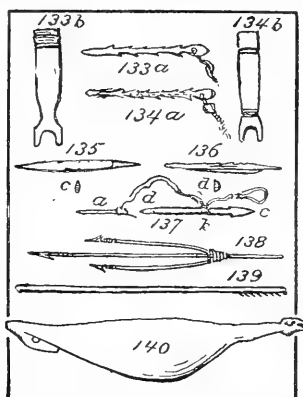
WEAPONS OF WAR AND OF THE CHASE—CLUBS.

- Fig. 128. CLUB. For killing sea-otter. Carved to represent the animal. Cat. No. 88828, U. S. N. M. Haida Indians, Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 129. CLUB. For killing sea-otter. Cat. No. 88825, U. S. N. M. Haida Indians, Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 130. CLUB. For killing seals. Carved sea-lion. Cat. No. 88824, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 131. CLUB. For killing seals. Carved seal. Cat. No. 88930, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 132. WAR CLUB. Carved to represent the raven. The three figures (a, b, and c) are frogs. Tsimshian Indians, Fort Simpson, British Columbia. Collected by James G. Swan.



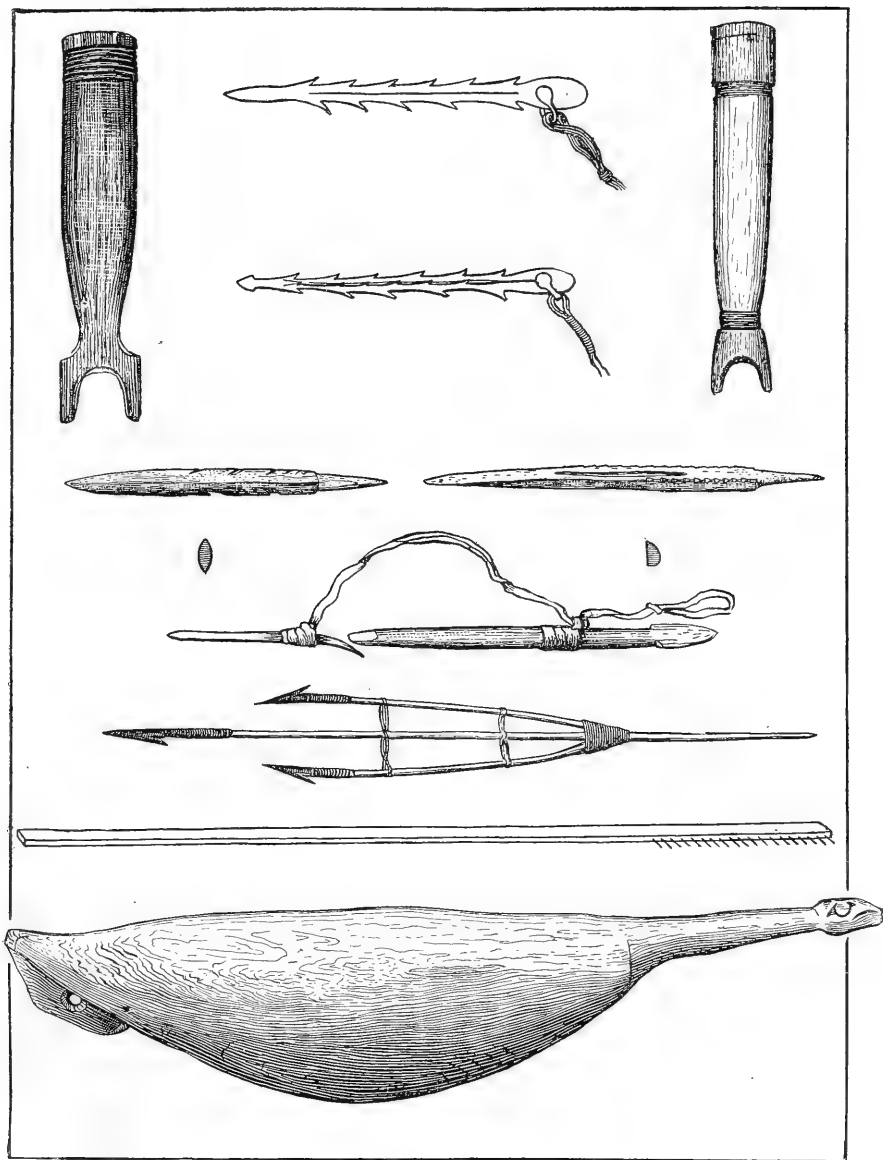
WEAPONS OF WAR AND OF THE CHASE—CLUBS.

EXPLANATION OF PLATE XXIX.



HAIDA AND TLINGIT HUNTING AND FISHING IMPLEMENTS.

- Fig. 133 (*a* and *b*). SEAL SPEAR-HEAD. Of steel. Head detachable from foreshaft and secured by a plaited lanyard of sea-weed made fast to a shackle in the butt. The case *b* is made of two pieces of cedar lashed together with split spruce-root. Cat. No. 88929, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 134 (*a* and *b*). SEAL SPEAR-HEAD. Barbs on the back as well as on the sides. Cat. No. 88890, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 135. BONE SPEAR-HEAD. Barbed and detachable. Cross section shown in *c*. Cat. No. 74962, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 136. BONE SPEAR-HEAD. Cross section shown in *d*. Cat. No. 74963, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 137. SPEAR-HEAD. Of steel; foreshaft of wood. Steel head shown in *a*; foreshaft in *b*. The point *d* fits into a socket in the spear-head *a*. The point *c* of the foreshaft fits into a socket in the spear-head. Cat. No. 88803, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 138. FISH SPEAR-HEAD. Three prongs of steel. Cat. No. 18933, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by James G. Swan.
- Fig. 139. FISH RAKE. Teeth of sharpened iron nails. For taking herring during a run. From a sketch by the author.
- Fig. 140. HALIBUT LINE-FLOAT. Of cedar wood; carved to represent a shag or duck. Cat. No. 43237, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by Commander L. A. Beardslee, U. S. Navy.



HAIDA AND TLINGIT HUNTING AND FISHING IMPLEMENTS.

Emmons Collection. Fig 137, Plate XXIX, represents a flat steel spear head, *a*, with detachable wooden fore-shaft, *b*. A line attached to the head is also fastened to the end of the spear shaft, allowing several feet

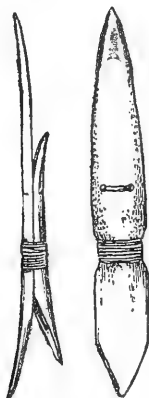


Fig. 137e.

BONE SPEAR-HEAD.

(Tlingit. Emmons Collection.)

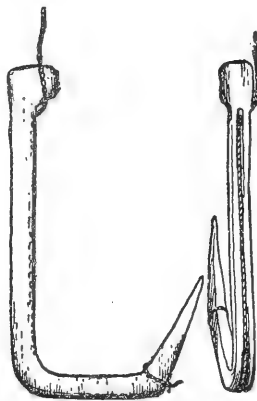


Fig. 149a

SALMON GIG.

(Tlingit. Emmons Collection.)

drift. This type is adapted to the capture of other kinds of fish and even the sea-otter, but one better for all purposes of hunting and fishing is that shown in Fig. 150, Plate XXX. A detailed description of the spear complete may not be out of place, as it is the general coast Indian type from Puget Sound to Cape St. Elias. Such a spear consists of three parts, the shaft, fore-shaft, and head. The shaft is a light cedar pole, having in the outer end a socket, and served on that end with a wrapping of cedar bark fibre or spruce root to prevent its splitting. The general type of fore-shaft is that shown in Fig. 137*b*, Plate XXIX. It is of cedar wood, about 8 to 10 inches long, and pointed at both ends, that at *c* being a flat leaf-shaped expansion fitting into the socket in the end of the shaft. The point *d* fits into a socket in the butt of the spear head. The usual type of spear head as now found is that shown in Fig. 150, Plate XXX, consisting of a barbed arrow-shaped head of steel with a socket at the butt formed by two pieces of bone lashed to the end of the steel tip. The lashing tapers, and is usually covered with spruce gum so as to offer no obstruction to the whole head entering a fish, seal, or other victim. The lashing also secures the end of a laniard about 2 feet or more long, the other end of which goes to the end of the shaft and is there lashed. In other words, the detachable head is really attached to the spear shaft by a very stout cord. The two bone barbs at the butt of the spear head form the socket for the end *c* of the fore-shaft. When the game is struck the fore-shaft comes away from both the spear shaft and spear head, but the head is secured to the spear shaft by its laniard, and a harpoon line is bent to the spear shaft, so that the captured animal is on one end of a continuous line of which the other is

either attached to a float or is in the hand of the Indian. Fig. 150a is another steel salmon spear head of the same type, while Fig. 138, Plate XXIX, is a three-pronged spear of a very different type. In its more primitive form the three barbed prongs are of long pieces of bone with barbed and serrated edges. Sometimes the same design as that shown is found, in which the arrow-shaped tips are of bone or shell. Steel is now generally used, the fore-shaft of the head being permanently secured into a socket in the head of the cedar wood spear shaft with a tough lashing and a coating of spruce gum at the joint.



Fig. 150a.

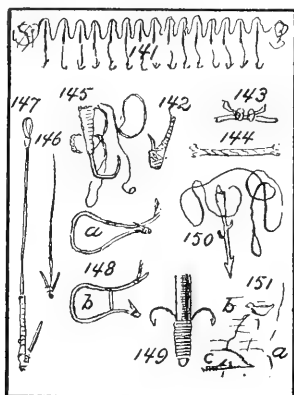
SALMON SPEAR-
HEAD.

(Tlingit. Emmons Col-
lection.)

Fish hooks.—The apparently clumsy hooks of this region have been found to possess so many advantages over the type used by Europeans that they are retained by the Indians to this day. Curiously enough the use to which they put our large steel hooks is shown in Fig. 149, Plate XXX, viz, as spear heads, to which they are admirably adapted. There is little in the art of fishing that we can teach these Indians, and their conservatism is founded on exceedingly good judgment, although it is not to be denied that superstitious belief in the efficiency of certain forms of hooks is somewhat of an element in such conservatism. One advantage the native hooks undoubtedly possess over our own is in not being liable to foul the bottom. A very primitive type of hook is that shown in Fig. 147, Plate XXX, in which the barb

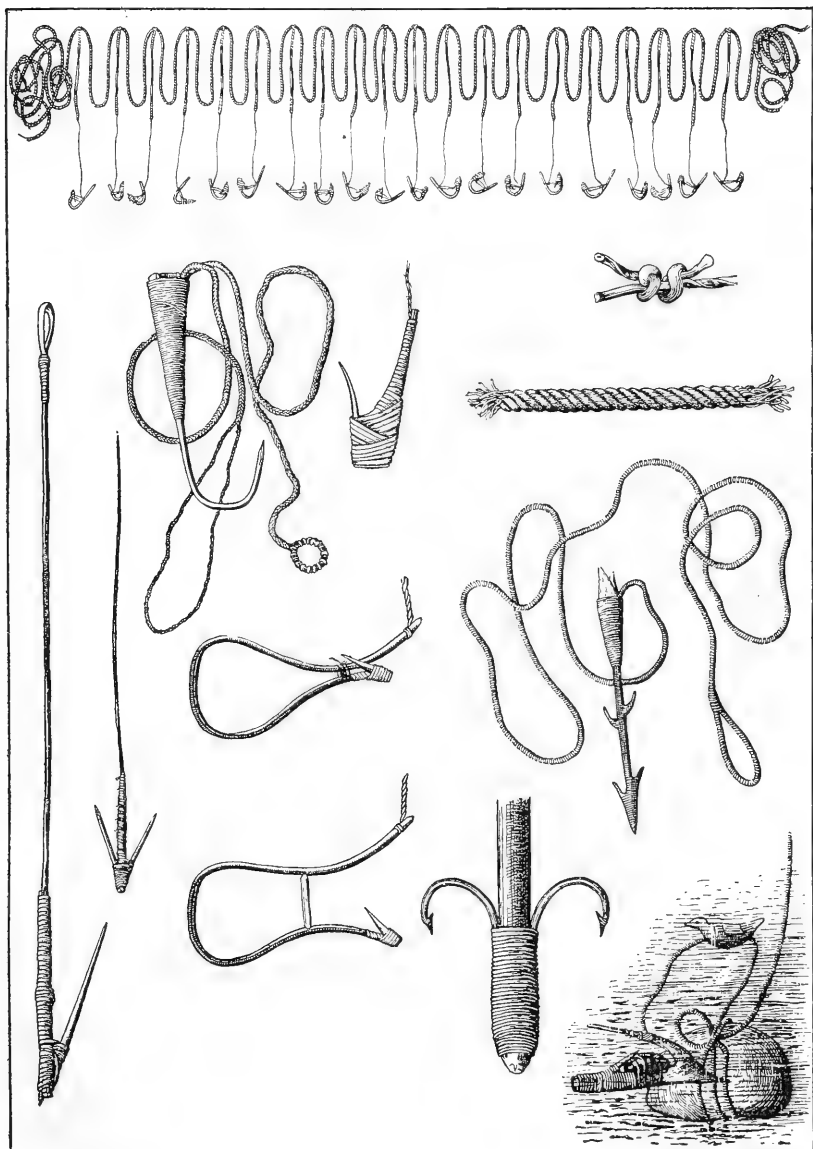
is a straight piece of bone, the shank a piece of wood, and the snood or suell a piece of whale bone. The snood is attached to the shank by a lashing of bark. This type of hook must be distinguished from the double-pointed one similar in general construction shown in Fig. 146. This is a sort of gig or snag for hooking fish where they are plentiful. Fig. 145 is such an instrument pure and simple, the iron head shown fitting to a cedar pole shaft. It is used for gigging salmon where they are thick and sluggish during the "runs." A very primitive type of hook not uncommon in Alaska is that shown in Fig. 142, consisting of a small narrow block of wood with a spike of bone, shell, or iron, and a snood of spruce root, kelp or whale bone. The general varieties of hooks used in the northern region about Dixon Entrance are shown in Plate XXXI. Of these the primitive halibut hooks are Figs. 155, 156, 159, and 161. The first two are made in two pieces, each lashed at the joint with cedar bark, the shanks being carved with designs supposed to give good luck to the fisherman. The barbs were formerly of bone or shell, but later of iron. The last two are made from the forked branches of a tree dressed down to neat dimensions, and are very strong and serviceable, often bringing up halibut weighing from 50 to 120 pounds. The bait is lashed to that arm of the hook which carries

EXPLANATION OF PLATE XXX.



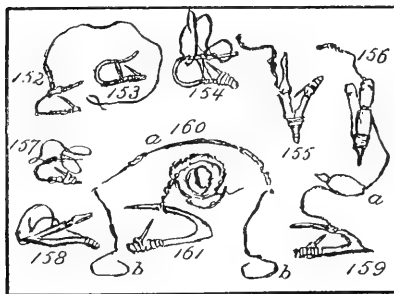
FISHING IMPLEMENTS FROM THE NORTHWEST COAST.

- Fig. 141. TRAWL LINE. Of cedar roots, with whalebone snoods or ganging and cedar hooks for ocean fishing. Cat. No. 6560, U. S. N. M. Kwakiutl Indians, Vancouver Island, British Columbia. Collected by Dr. T. T. Minor.
- Fig. 142. HOOK. Of wood, with iron or bone barb and whalebone or cedar-withe shank. Primitive type.
- Fig. 143. Knot by which the Haida join sections of kelp-stem fishing-lines together.
- Fig. 144. Piece of cord spruce-root, cedar bark, or other vegetable fiber used as fishing-line.
- Fig. 145. Jig or snag for hauling out salmon. Cat. No. 129979, U. S. N. M. Nimpkish Indians, Fort Rupert, British Columbia. Collected by James G. Swan.
- Fig. 146. FISH-HOOK, jig, or snag, with two barbs; bone point; whalebone ganging or snood. Primitive type, Cat. No. 74189, U. S. N. M. Makah Indians, Neah Bay, Washington. Collected by James G. Swan.
- Fig. 147. FISH-HOOK. Single-barbed, with bone point and whalebone snood. Same type as Fig. 146. Cat. No. 74188, U. S. N. M. Makah Indians, Neah Bay, Washington. Collected by James G. Swan.
- Fig. 148 (*a* and *b*). HOOK. For black cod. *b* shows peg in position and hook baited; *a* shows position when not in use, with lashing tightly drawn to preserve the elasticity. Collected by James G. Swan.
- Fig. 149. SALMON SPOON. Made of European steel fish-hooks. Collected by James G. Swan.
- Fig. 150. SEAL OR SALMON SPEAR. Head detachable, showing the lanyard by which it is made fast to the spear-shaft. Cat. No. 129980, U. S. N. M. Nimpkish Indians, Fort Rupert, British Columbia. Collected by James G. Swan.
- Fig. 151. Sketch showing halibut line with stone sinker *a*, float *b*, and hook *c*.



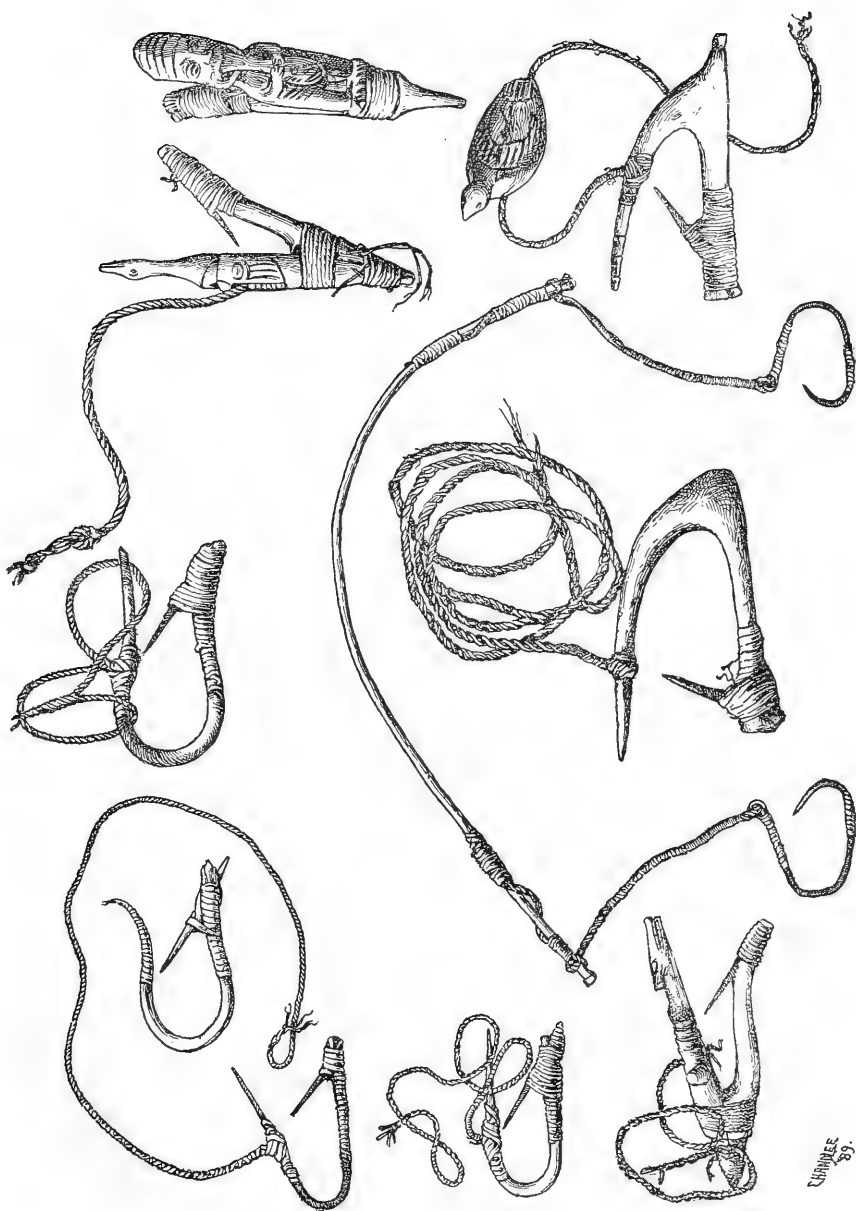
FISHING IMPLEMENTS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XXXI.



FISH-HOOKS FROM THE NORTHWEST COAST.

- Fig. 152. HALIBUT HOOK. Of iron, modeled after wooden type. Lashing designed to secure the bait around the point; the lines or snoods of cedar-bark twine, spruce root, kelp, sinew, or hide served with bark or spruce-root fiber. Cat. No. 88778, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 153. FISH-HOOK. Of yew, with bone barb. Cat. No. 72649, U. S. N. M. Makah Indians, Cape Flattery, Washington. Collected by James G. Swan.
- Fig. 154. FISH-HOOK. Of yew, with iron barb. Cat. No. 88765, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 155. FISH-HOOK. Of spruce, representing a sea-gull. Cat. No. 42976, U. S. N. M. Tlingit Indians, Sitka. Collected by Commander L. A. Beardslee.
- Fig. 156. FISH-HOOK. Representing a medicine man. Cat. No. 74351. Tlingit Indians, Sitka. Collected by John J. McLean.
- Fig. 157. HALIBUT HOOK. Similar to 154. Cat. No. 88780, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 158. HALIBUT HOOK. In two pieces; barb of iron; snood of spruce root. Cat. No. 88766, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 159. HALIBUT HOOK. Iron barb; carved wooden float. Cat. No. 88762, U. S. N. M. Masset Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 160. RED-FISH HOOK. The rod *a* of spruce; the hooks *bb* of iron; the snoods of buckskin. Cat. No. 89208, U. S. N. M. Skidegate Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 161. HALIBUT HOOK. Largest type. Cat. No. 20656, U. S. N. M. Tsimshian Indians, Fort Simpson, British Columbia. Collected by James G. Swan.



FISH-HOOKS FROM THE NORTHWEST COAST.

the barb and just under it. Fig. 158 is also a primitive type of hook made in two pieces and of the same character as those just described. A second primitive variety is that made by steaming and bending a tough limb of yew or other wood into the shape shown in Fig. 153, which is a Makah hook from Cape Flattery, Washington Territory (Wakashan stock). Their hooks are by far the neatest on the coast, and are traded to the northern Indians. The lashing shown across it in the plate is for securing the bait, this being the method of winding the string when the hook is not in use. Fig. 152 is a Chilkat and 157 a Haida version of this same type of hook. Fig. 152 is an iron one modeled also on this design, and similar in shape to Fig. 161.

Another kind of hook differing from those just described in shape, principle, and freedom from fouling the bottom, is used for catching cod, flounders, etc., and is thus described by Judge J. G. Swan in a pamphlet on the fisheries of the north:

They are made of the knots of hemlock limbs cut out from old decayed logs. These are split in pieces of suitable size and whittled to the required shape, and bent by being steamed into the form which in the *skil* hook resembles the longitudinal section of a goose egg. The lower portion of these hooks are curved inward to form a barb, and when not in use the two ends of the hook are fastened together by a piece of twine, which is also used to tie on the bait. When the hook is to be used the two parts of the hook are separated by means of a stick or peg, which the fish knocks out when he takes the bait, and the two ends of the hook close together and hold him fast; the peg floats to the surface and indicates to the Indian that he has caught a fish.

The sinker is another ingenious contrivance; it is a large stone, weighing from 12 to 15 pounds, and a smaller one to serve as a tripping stone; the line is firmly wound around these stones with many turns, and a bight or loop tucked under one of the parts in the same manner a signal officer rolls up a flag in a ball and tucks a bight of the haliard under a turn, which, when pulled out, sets the flag free; so when the Indian fisherman thinks, from the number of floating pegs, that he has enough fish, he pulls out the loop of his line, the stones become loosened and fall out, and he hauls in his line relieved of their weight.

The Haidas frequently put on one hundred hooks to a single line, which acts like a trawl, and so plentiful are the black cod that often from fifty to seventy-five are hauled in at one time. The bait used seems to be anything handy, as the *skil* is a greedy feeder, and will take either fresh herring, squid, or a strip of the white skin from a halibut's belly. The Indian, however, has enemies to contend with; one of the most formidable is the ground shark, or *nurse fish*, as the sailors call them, which will eat off the bodies of a whole line full of fish, leaving only their heads; there is a small fish of the cottoid or sculpin variety (*Blepsias cirrhosus*)—*Nukaio*, *kaiungo*—(Haida) which will steal the bait and sometimes gets caught. Dogfish also are at times very troublesome. Whenever the Indian is sure of the presence of these pests he goes to another place to fish.

This type of hook is also reproduced in iron. A sketch is given in Plate xxx, Fig. 148 *a* and *b*. The former shows the hook baited and pried open with a peg; the latter shows it when not in use, lashed to preserve the spring in the wood or iron. Fig. 160, Plate xxxi, shows a peculiar device used by the Haida for catching red fish. The withe of wood, *a*, is tough and elastic, and secured at its middle point to the

line. The hooks are somewhat on the pattern of those just described, but no pegs are used. Fig. 141 represents an Indian trawl line for the ocean fisheries of the northwest coast. The ground-line is made of cedar roots, the snoods or gaugings of whalebone and cedar, and the hooks of steamed and bent cedar wood, with barbs of iron. Except in the use of an iron barb the whole device is a very primitive pattern.

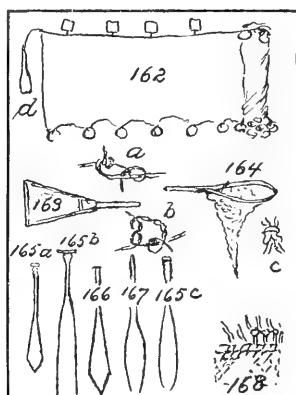
It should be noted here, however, that the use of whalebone is found extensively amongst the southern coast Indians (especially of Vancouver Islands), and the Kenai, Aleut, and Eskimo, but rarely amongst the Tlingit, Haida, and Tsimshian. For superstitious reasons the whale has never been hunted in this last named locality, and the eating of whale's blubber has been prohibited to them by tradition and custom. Where whalebone is found in use amongst them it has reached them in the way of trade from the north or south.

Fish-rake.—A rake consisting of a long thin lath with sharp spikes of bone, copper, or iron on one edge, like a comb, as shown in Fig. 139, Plate XXIX, is used in herring and eulachon fishing. With these instruments the Indians beat the surface of the water, during the "run" of these fish in enormous shoals, seldom failing to bring up two or three at a time, transfixed on the sharp teeth.

Fish-baskets.—These differ little from the open mesh type of basket hereafter described. They are used for dipping out fish during the "runs" and in this sense are simply dip-nets.

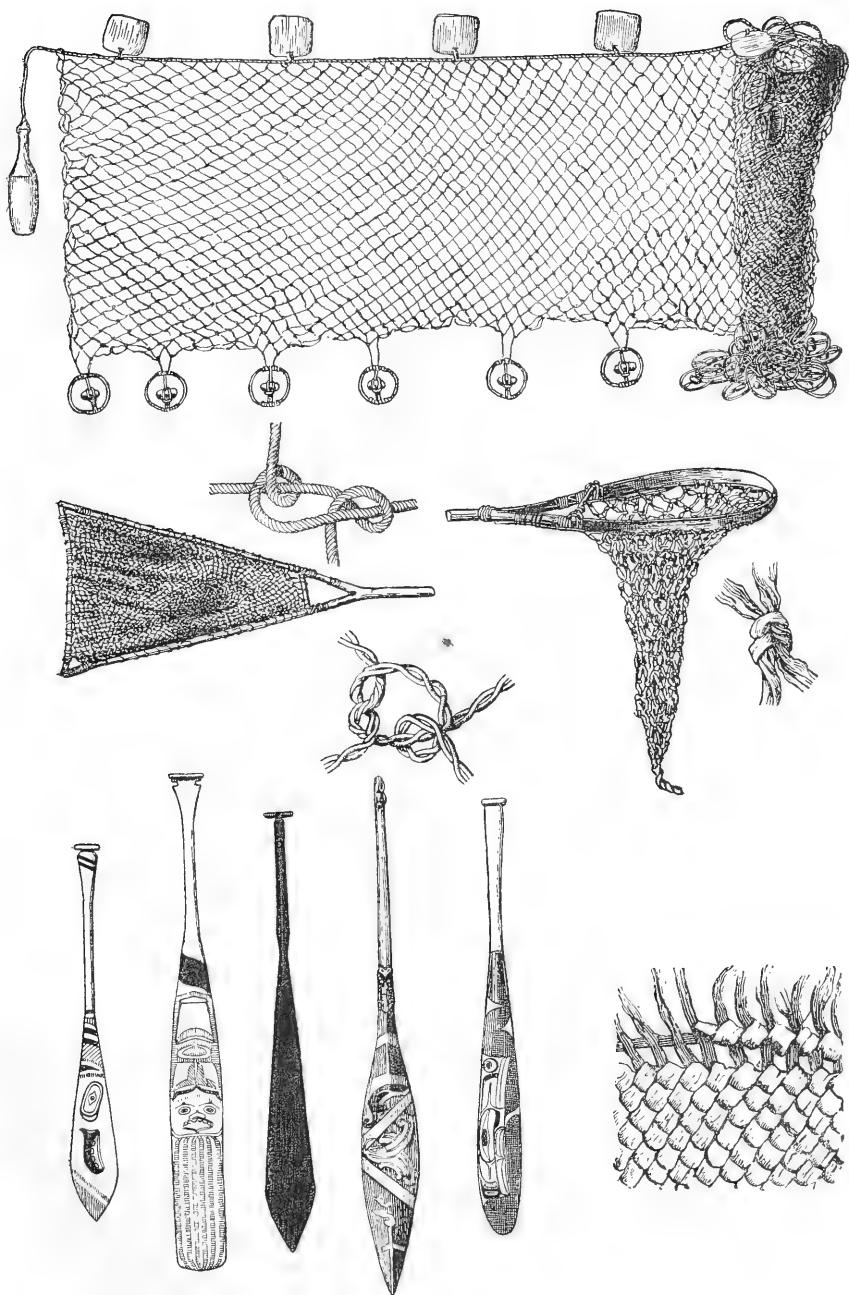
Fishing-lines.—These are either made from the stems of the giant kelp, which grows so abundantly on the coast, or from vegetable fiber, such as bark, spruce, and cedar roots, etc. Sinew and whalebone are little used amongst the northern coast Indians. The vegetable fiber is neatly twisted into two or three strand cord, as shown in Fig. 144, Plate XXX, although sometimes plaited with threads of wild hemp or shredded sea-weed. The stems of the giant kelp are cured in the smoke or sun and simply knotted together, the usual knot being that shown in detail in Fig 143, Plate XXX. This kelp grows in from 3 to 30 fathoms, or deeper. At the root it is about one-fourth inch in diameter, and solid, expanding upwards and becoming hollow about half way up. Its upper end is surmounted by a large hollow bulb, from which floats long, streamer-like, or lanceolate leaves. These are great rock or shoal indicators, and are invaluable "notices to mariners." Judge Swan says: "The Indians cut these stems close to the bottom with a simple instrument formed of a V-shaped branch, across the smaller portion of which a knife blade is secured; this is lowered over a kelp plant in 20 or 30 fathoms, and the stem easily cut off by a sudden pull of the line attached to the cutter." The solid stems are used for fishing-lines and the bulbs for oil bottles, both being cured by soaking in fresh water and drying in the smoke or sun. The smoke-dried lines are black, and the sun-dried of a light yellow or neutral color. It should be noted here that the Yakutat and other Tlingit of the extreme North have

EXPLANATION OF PLATE XXXII.



DRAG AND DIP NETS; PADDLES; DETAILS OF NETTING AND BASKET WEAVING.

- Fig. 162. DRAG-NET OR SEINE. Woven from twisted thread of cedar-bark fiber, with roping of same material. The details of the knots are shown in Fig. 162a. The wooden float *d* is on the end of the drag-line. The wooden floats on the head of the net are flat pieces of wood spaced about 3 feet apart. The sinkers at the foot are black pebbles or stones lashed in a circular wooden hoop and spaced from 8 to 10 inches apart. Length of net, 52 feet; depth, 64 inches. Cat. No. 89203, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 163. DIP-NET. Triangular in shape, with frame of forked branches of tree with two cross pieces. The details of the netting are shown in Fig. 163b. Cat. No. 89209, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 164. DIP-NET. Of cedar-bark fiber; oval frame. Used to catch echini. Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 165 (*a*, *b*, and *c*). PADDLES of the Haida and Tlingit; painted in totemic design. Fig. 165*b* represents the type of steering-paddle, while *a* and *c* are the ordinary type.
- Fig. 166. PADDLE. General type of Puget Sound and South Coast Indian paddle.
- Fig. 167. PADDLE. New Zealand. Painted in a design similar to the totemic ornamentation of this region.
- Fig. 168. BASKET WEAVING. (From Plate XIV, Fig. 25*b*, Smithsonian Report, 1884. Aboriginal basket-making. Prof. O. T. Mason). Makah Indians, Neah Bay, Washington. Collected by James G. Swan.



DRAG AND DIP NETS; PADDLES; DETAILS OF NETTING AND BASKET WEAVING.

been much influenced by the Kenai and Aleut, who use sinew, bladders, and intestines of animals, in the manufacture of their fishing implements. Dixon (1787) speaking of the Yakutat halibut fishing says:

They bait their hooks with a kind of fish * * * or squid, * * * and having sunk it to the bottom they fix a bladder to the end of the line as a buoy, and should that not watch sufficiently they add another. Their lines are very strong, being made of intestines of animals. One man is sufficient to look after five or six of these buoys; when he perceives a fish bite he is in no great hurry to haul up his line, but gives him time to be well hooked, and when he has hauled the fish up to the surface of the water he knocks him on the head with a short club provided for that purpose, and afterwards stows his prize away at his leisure. This is done to prevent the halibut (which sometimes are very large) from damaging or perhaps upsetting his canoe in their dying struggles. Thus were we fairly beat at our own weapons, and the natives constantly bringing us plenty of fish our boat was never sent on this business afterwards.†

Amongst the Tlingit these floats are generally duck-shaped and carved from wood, although bladders are also used amongst them as mentioned by Langsdorf (1805), who says: "To every line is fastened a small bladder, which floats upon the surface of the water, so that one person can attend fourteen or fifteen lines."‡

Floats.—The modern type of fishing-float is of wood, carved to represent an aquatic bird of some sort, and these floats are of two kinds, under-water and surface. The surface floats have been spoken of above, and one is represented in Fig. 140, Plate XXIX. The under-water ones are to float the halibut hooks just clear of the bottom, as shown in Fig. 151*b*, Plate XXX, as it is here that the halibut feeds. The stone sinker, *a*, is detachable from the line, and is used to keep the hook and float both near the bottom. This style of float is also illustrated in Fig. 159, Plate XXXI.

Fishing-clubs.—These have been spoken of at the beginning of this chapter and illustrated in Plate XVIII. A peculiarly carved club is used for each different kind of animal, superstitious reasons being given for such variety.

Drag-nets.—Nets are made from cedar bark, wild hemp, or wild nettle fiber, spun into twine, and now woven with a shuttle similar to that used by fishermen on our own coast. Some of these are small, and are secured to poles and dragged between two canoes; others are long and are similar to our seines. Fig. 162, Plate XXXII, represents a Haida drag-net of this last kind. The roping is of cedar bark; the netting, of hemp twine; *d* is a wooden float on the end of the drag-line; the floats along the head are thin flat blocks of cedar wood, spaced about 3 feet apart; the sinkers at the foot are black pebbles or stones lashed in a circular hoop and spaced about 8 to 10 inches apart. Details of the netting are shown in Fig. 162*a*. The net from which this illustration was drawn is 52 feet long and 64 inches deep, from Masset, Queen Charlotte Islands, British Columbia. What were the styles and by

* Dixon, Voyage, p. 174.

† Langsdorf, Voyages, pt. II, p. 134.

what means nets were woven before the advent of the whites, the writer was unable to learn.

Dip-nets.—Two varieties of these are shown in Plate XXXII, Figs. 163 and 164, the frame of the one being oval and the other triangular. Details of the netting are shown in *b* and *c*. Fig. 163 is the kind used by the Indians for scooping up echini or sea-urchins at low tide, while Fig. 164 is the kind used for dipping out salmon caught in the river-traps, and for herring, eulachon, etc., during the “runs.”

Weirs.—Across the streams where salmon run weirs are usually built for trapping them. Where the water is shallow and swift, frames of split sticks, interwoven with older branches in a kind of basket-work, are stretched across, driven into the bottom, and strengthened with braces held in position by pegs. These frames, or weirs, are spaced a little distance apart, so that when the salmon leaps the first frame he is trapped between it and the second, and is removed by a dip-net or speared at leisure. In deeper water the dam, or weir, consists of a basket-work frame with round openings here and there, with passage-ways conical in shape, formed by converging pointed sticks, like some kinds of wire rat-traps. The salmon going up stream forces his way through and is trapped in a basket-work compartment and dipped out at leisure.

Bird and other land traps.—The usual forms of Indian traps are found in this region, consisting of a cage and figure-of-four trigger, a bent sapling with snare noose, and the larger game traps of the usual dead-fall pattern.

Canoes.—The canoe is to the northwest coast what the camel is to the desert. It is to the Indian of this region what the horse is to the Arab. It is the apple of his eye and the object of his solicitous attention and affection. It reaches its highest development in the world amongst the Haida of the Queen Charlotte Islands. Classified according to shapes, sizes, and uses, there may be said to be four kinds on the northwest coast: (1) hunting, (2) family and transporting, (3) voyaging, and (4) war. The voyaging and war canoes, although kept for different purposes are practically the same in size and shape, the differences, if any, being slight.

Hunting and fishing canoes.—These are somewhat similar throughout the whole coast and are well illustrated in the models shown in Plate XXXIII. The upper view in the illustration is by far the most common type of hunting canoes, but the lower one is that seen about Dixon Entrance. They are light portable dugouts carrying from one to three people.

Family or transportation canoes.—These are from 25 to 35 feet long and 4 to 6 feet beam, carrying whole families of from four to fifteen with camping outfit, trading supplies, baggage, provisions, etc., amounting often to 2 tons weight or more. Farther south, around Puget Sound and Vancouver Island, this kind of canoe has a straight stern post, as

shown in Plate xxxiv, Fig. 171. Amongst the Haida and other northern tribes the stern projects backwards and slightly upwards, forming a long spur running down to a straight edge near the water line (Fig. 172, same plate). The bow also curves upward and has a regular and gracefully shaped cut-water.

Voyaging canoes.—These are from 35 to 65 feet long and 6 to 8 feet beam, with flaring gunwale and long projecting spurs on both bow and stern. These latter are generally scarfed on to the main body of the canoes, and with the flare of the bows help to make them more sea-worthy. Poole (1863) describes the canoe of Chief Kene, of the Queen Charlotte Islands, British Columbia (in which he made a voyage from the latter's village to Victoria, British Columbia), as having three masts, three sails, and a mainstay-sail, and carrying thirty-seven people, with two tons of baggage, freight, etc.* When it is reflected that these large canoes, often with 5 tons capacity, are hewn from a single log, our marvel at the skill displayed in their construction is decidedly increased. To-day the custom of painting the bow and stern in elaborate totemic patterns is rapidly dying out, but formerly it was practiced throughout the whole coast. The totem was also sometimes indicated by a carving, either wrought on the spur or secured to it on the top or sides. Vancouver (1793) found this custom as far south as the Kwakiutl, of Gardner Channel, British Columbia. Of a canoe which he saw there he says "its head and stern curiously decorated with carved work and rude and uncouth figures in painting."†

War canoes.—These, in primitive times, are said to have formed a distinct class in themselves, having been elaborately painted and decorated, but latterly the voyaging canoes have practically taken their places, there having been no real difference in point of construction or size between the war and transporting craft. It is doubtful if any real distinction could ever have been drawn.

Canoes in general.—There is a marked difference in the canoes of the northern and southern Indians. It is not so much in the mere outward appearance as in the shape of the cross-section and in the lines. The northern canoe is superior in all the points by which we judge their qualities. At the head of the respective types are those of the Haida in the north, and of the Makah, of Cape Flattery, Washington Territory, in the south. The former have projecting prows, high, spur-shaped sterns, flaring gunwales, and a gracefully rounding or curving cross-section, although without any distinct keel. The latter have the blunt, straight stern, a gracefully curving bow, but a flat bottom, with little curve in the cross section. This type is heavier, roomier, stronger, less cranky, and more durable than the Haida type, but the latter is swifter, handier, and more buoyant. The Haida have in some of their larger canoes somewhat copied the Makah type for the greater strength

* Poole, Queen Charlotte Islands, p. 269. † Vancouver, Voyage, Vol. I, p. 303.

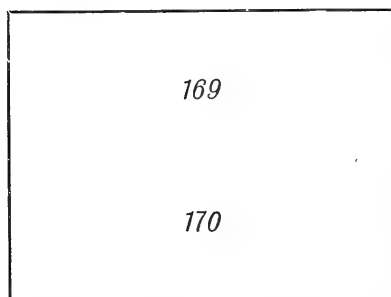
secured. An admirable illustration of this adaptation is seen in the enormous Haida canoe in the U. S. National Museum (No. 26785), which is very much like Fig. 171, Plate XXXIV, in appearance. Its dimensions are as follows: Length, 59 feet; beam, 8 feet; height of stem, 7 feet 3 inches; height of stern, 5 feet 3 inches; height amidships, 3 feet 7 inches. However much the larger canoes may differ in shape and character, the light, portable hunting canoes (Fig. 169, Plate XXXIII) are much the same throughout the coast.

Before the sea-otter became extinct they were hunted well out at sea, the Haida being particularly venturesome and successful, and hence rich, and respected accordingly. One of their chief sources of revenue to-day is in the building and sale of canoes, which they tow to Port Simpson or up into Alaska and sell or trade to their neighbors. The tendency of the day is in the direction of smaller sizes for the canoes than formerly. This is but the natural result of peaceful times, when it is not necessary to travel in such large parties for mutual protection. However, the Yakutat and Sitka canoes were never as large as those of the Haida, as from earliest times the latter have possessed the largest canoes on the coast. The post of honor in a canoe is at the steering paddle aft. Usually this position is occupied by a woman or an elderly man, the steering being accomplished by a few adroit side strokes interjected into the regular process of paddling. In the family canoe there are few idlers, even the young children wielding paddles and "working their passage."

Canoe Outfit.—This consists of masts, sails, paddles, bailers, and mats. Ballast of stone is sometimes, though rarely, carried. The masts and sails have been added since the advent of the whites, the rig being sprit-sail, and the number of masts varying from one to three. Masts and sprits are of light cedar wood, and sails, originally of mats, are now invariably of white cotton sheeting. These canoes will not sail on the wind, but with a flowing sheet the speed made is astonishing. The northern type of paddle is that shown in Fig. 165 *a, b, and c*, Plate XXXII; the southern, that in Fig. 166. As may be expected, the northern paddle is ornamented with the design of the owner's totem. Fig. 167 is a New Zealand paddle, introduced by way of showing the similarity of this in connection with the many other objects common to these two remote regions. A bailer is imperfectly shown in Plate XXXII. It is simply a scoop of wood with a short straight handle. Mats are sometimes carried in the canoes to cover them when hauled up and to throw over the cargo or household or camping effects in transit. The Indian is exceedingly careful of his canoe and all that pertains to it. In landing, a gravel beach is selected, where possible, and the canoe hauled well up beyond high tide. When it is to remain any time exposed to the weather, it is protected from warping and cracking from the sun's heat by a cover of mats or boughs of trees.

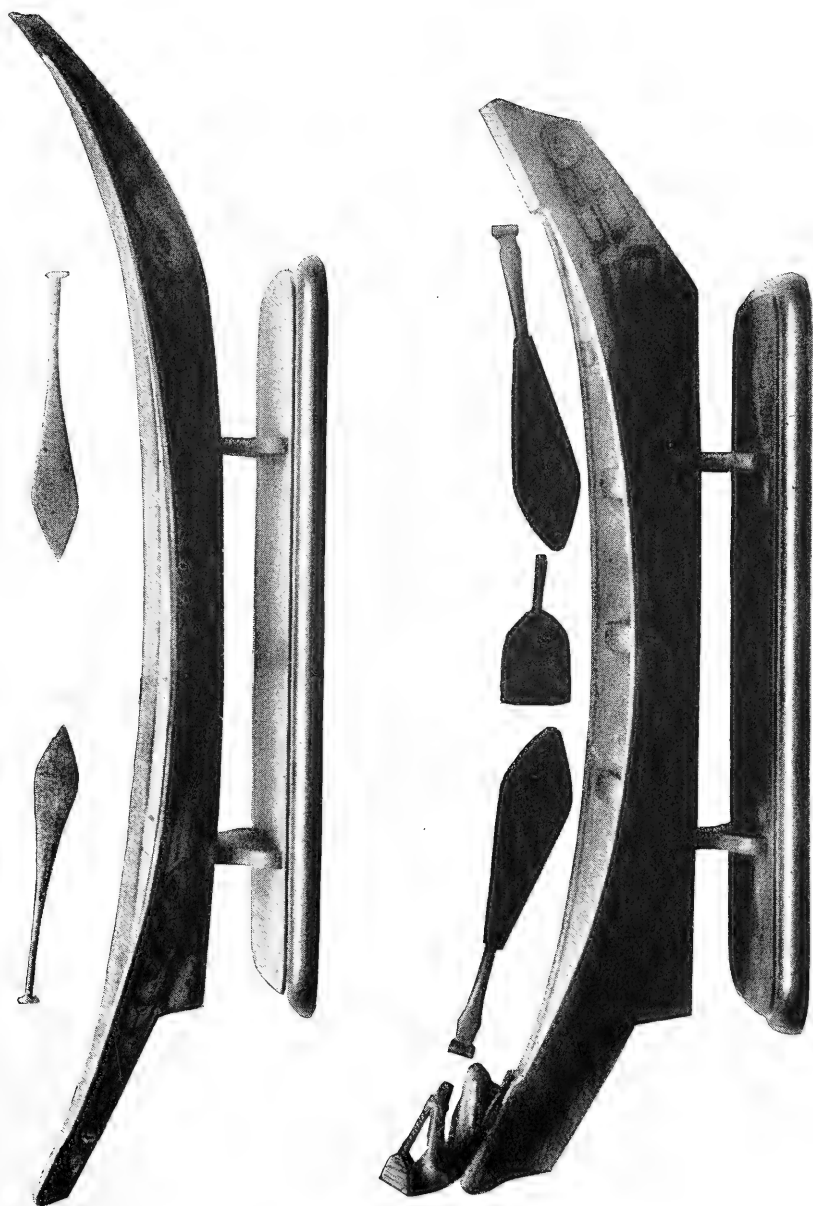


EXPLANATION OF PLATE XXXIII.



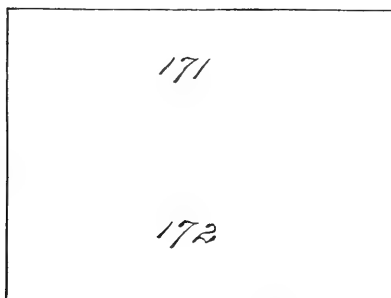
MODELS OF GENERAL TYPES OF HUNTING AND FISHING CANOES NORTHWEST COAST.

- Fig. 169. HUNTING AND FISHING CANOE. This is the upper figure in the plate, and is an excellent model of a hunting and fishing canoe found throughout the coast. The paddles are of the Southern Coast Indian pattern. Cat. No. 640, U. S. N. M. Haida Indians, Fort Simpson, British Columbia. Collected by George Gibbs.
- Fig. 170. SMALL FAMILY OR SUMMER CANOE. For fishing, hunting, etc. Haida and Tlingit type. This style of totemic ornamentation is now only put on the models of canoes, but it was formerly the custom to so ornament all of them. The general type of northern paddle and baler is shown in outline. The paddles of both the northern and southern type are better shown in Plate XXXII, Cat. No. 21595, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by Dr. J. B. White, U. S. Army.



MODELS OF GENERAL TYPES OF HUNTING AND FISHING CANOES, NORTHWEST COAST.

EXPLANATION OF PLATE XXXIV.



FAMILY OR TRANSPORTATION CANOES OF THE NORTHWEST COAST.

- Fig. 171. CANOE. The upper figure in the plate illustrates the general type of South Coast Indian canoe, with its swan-like barbed prow and straight, blunt, high stern. The difference between this style and that found amongst the North Coast Indians is fully discussed in the text.
- Fig. 172. CANOE (lower figure). General type of the North Coast Indian canoe with its projecting prow and stern, round counter, and fine lines.



FAMILY OR TRANSPORTATION CANOES OF THE NORTHWEST COAST.

Canoe making.—The primitive tools used in canoe construction are so simple as to excite our surprise. The principal and almost only one used is the adze of some pattern or other shown in Plate XXIII, Figs. 92, 93, and 94. The logs for the purpose are usually gotten out in the summer season and rough hewn to somewhat the shape of the canoe in odd hours about the summer camp—the finishing work being left until winter. The trees are generally selected near some watercourse and felled in such a direction as to admit of launching them into tide water. The log is trimmed where felled to rough dimensions, launched, and towed to summer camp, where the preliminary work is done. Often by combined labor numerous logs are gotten out in this way at one time, made into a raft, and by means of sweeps and sails and by dint of working the tides brought to the village or to the neighborhood of the camps. Good trees for canoe purposes are sufficiently rare to make their selection difficult and expensive in both time and labor. The best wood for all purposes is the yellow cedar (*Chamaecyparis Nutkaensis*), found on the Queen Charlotte Islands and in spots around the southern Alaska boundary. The smaller canoes are made from the Sitka spruce (*Picea Sitchensis*), and the very largest from the giant cedar (*Thuja gigantea*). The whole process of canoe construction may be briefly described as follows: The tree is felled with an ax (formerly stone ones were used). The trimming and rough hewing is done by wedges and sledges. The rest of the work is done by patient cutting with an adze. The canoe being roughly worked out is widened in beam by steaming it with water and hot stones placed in the bottom of the canoe, stretchers or thwarts of gradually increasing sizes being forced in as the wood expands. The long spur ends in large canoes are neatly scarfed on to the body with a dovetailed joint and finished down as part of the whole. The smoothing work on the outside is often done with a chisel, but usually the interior of the canoe shows the chipping marks of the adze. The smoothing work on the exterior to lessen the friction of the water is furthered by the use of sandpaper, sandstone, or shark's skin. The conventional colors used now in painting are black outside and white inside, with a red strip on the inside of the gunwale running quite around the canoe and upon the bow and stern spurs. The process of painting is described in the next chapter. The lines of these canoes are remarkably fine and good; and when of considerable size and intelligently handled they are remarkably good sea-boats. Trips are often made in them to Victoria, British Columbia; and the Kaigani visit the outlying islands of the Prince of Wales Archipelago in the early summer in search of birds' eggs about 25 miles out to sea.

HUNTING AND FISHING.

METHODS OF CAPTURING ANIMALS.

Salmon.—The first run of salmon occurs about the middle of July, when they swarm in myriads into the mouths of the small fresh-water

streams. It is difficult to picture in the mind the abundance of these fish and the mad abandon with which they hurl themselves over obstacles, wounded, panting, often baffled, but always eagerly pressing on up the streams there to spawn and die. In some of the pools they gather in such numbers as to almost solidly pack the surface. When there is a waterfall barring their progress they may be seen leaping at the fall endeavoring to ascend it, often as many as six or more being in the air at once. The flesh at first hard and firm on contact with fresh water soon loses its color and palatableness, so that the sooner they are captured the better. The species of the first run vary along the coast. They are comparatively small, do not remain long, and do not furnish the bulk of the supply, although at the canneries now erected as many as two to five thousand have been known to be caught with one haul of the largest seines. About the middle of August the Tyee or King salmon arrives, the run often lasting the year out. When they first appear they are fat, beautifully colored, and full of life and animation; but soon are terribly bruised, their skin becomes pale, their snouts hook-shaped, their bodies lean and emaciated, and their flesh soft, pale, and unwholesome. In Wrangell Narrows is a waterfall of about 13 feet. At high tide the salt water backs up the stream and reduces this fall to about 8 feet, but never less even at spring tides, but the King salmon leaps the falls and numbers of them may be found in the fresh water above. The writer has deposited in the Smithsonian Institution several instantaneous photographs of leaping salmon taken by himself at this locality, but it is unnecessary to reproduce them in this connection. The whole of the territory on the northwest coast adjacent to the Indian villages is portioned out amongst the different families or households as hunting, fishing, and berrying grounds, and handed down from generation to generation and recognized as personal property. Privilege for an Indian, other than the owner, to hunt, fish, or gather berries can only be secured by payment. Each stream has its owner, whose summer camp, often of a permanent nature, can be seen where the salmon run in greatest abundance. Often such streams are held in severalty by two or more families with equal privileges of fishing. Salmon are never caught on a hook; this method, if practicable at all, being too slow. At the mouth of the streams they are speared or caught in nets. High up the streams they are trapped in weirs and either speared or dipped out with dip-nets. The Indians are beginning now to use seines and to work for salmon on shares, but the older ones are very conservative, and cling somewhat to primitive methods in a matter even so important to them as the capture of salmon, their chief food supply.

Halibut.—These may be taken at almost any season in certain localities, while they are more numerous during certain months in others. The Indians make the subject quite a study, and know just where all the banks are and at what seasons it is best to fish. Often villages are

located on exposed sites for no other reason than to be near certain halibut grounds. This fish varies in size from 20 to 120 pounds, and is caught only with a hook and line. The type of hook is that shown in Plate XXXI, and the method of sinking it shown in Plate XXX, Fig. 151. This fish stays close along the bottom, and is such a greedy feeder as to be readily caught by the clumsy hook shown. In fishing for halibut the canoe is anchored by means of stones and cedar bark ropes. The bait is lashed to the hook, a stone sinker attached to the line, and the contrivance lowered to the bottom. Sometimes the upper ends of the lines are attached to floats and more than one line tended at a time. A fish being hooked is hauled up, played for a while, drawn alongside, grappled, and finally despatched with blows of a club carried for the purpose. It requires no little skill to land a hundred-pound halibut in a light fishing canoe. A primitive halibut fishing outfit consists of kelp-lines, wooden floats, stone sinkers, an anchor line, a wooden club, and wooden fish hooks. It is impossible with our most modern appliances to compete with the Indians in halibut fishing. With their crude implements they meet with the most surprising success.

Herring and eulachon.—Herring are found in the summer months in numerous parts of the coast, depending on the nature of the feeding ground. They run in large shoals, breaking the surface of the water, and attracting in their wake other fish, porpoises, whales, whale "killers," flights of eagles, and flocks of surf birds, all feeding either on the herring or on the same food as that of which they themselves are in search. They are dipped out by the Indians with nets or baskets, caught with drag-nets, or taken with the rakes previously described. Eulachon or "candle-fish" run only in the mouths of rivers, particularly the Skeena, Nass, and Stikine in this region. They are considered great delicacies, and are dried and traded up and down the coast by the Indians who are fortunate enough to control the season's catch.

Cod are caught with the *skil* hook previously described. Dogfish, flounders, and other kinds are caught with almost any kind of hook, there being no especial appliances used or required.

Spawn.—For taking fish eggs that have already been spawned, the Indians use the branches of the pine tree, stuck in the muddy bottom, to which it readily adheres, and on which it is afterwards dried. When dry it is stripped from the branches and stored in baskets or boxes; sometimes buried in the ground. The spawn gets a pleasing flavor from the pine. Roe is taken from captured fish and either dried or buried in the ground to become rank enough to suit the epicurean palate of the Indian gourmand.

Sea otter.—The custom in former days was to hunt the sea-otter either from the shore or in canoe parties. They were shot with arrows from behind screens when they landed to bask on the sand or on the rocks, or approached noiselessly by canoe parties when asleep on the water.

Very thin light paddles were used, and if the Indian could get near enough the sleeping animal was harpooned. The common custom was, however, to hunt in parties. An otter being sighted was surrounded by canoes in a very large but gradually lessening circle, advantage being taken of the necessity of the animal to come to the surface to breathe, when it would be shot with arrows or harpooned from the nearest canoe. The Tlingit and Haida were not so expert as the Aleut, because their canoes were not so well adapted to the exposure at sea. In recent years the few remaining sea-otters have been hunted with fire-arms. The Indians are poor marksmen, and under the excitement of firing the instant the otter rises many accidents to their own number have happened, particularly to those on opposite sides of the circle. By a curious rule the otter, and all other game, belongs to the one who first wounds it, no matter who kills it. As the otter floats when killed, the same skill is not required as in seal hunting, but so scarce have they become now, that not more than forty or fifty are killed in a season throughout the northern coast Indian region.

Seals.—Seals are hunted in practically the same way as just described, but from the fact that on account of their bodies not floating it is necessary to harpoon them before they sink, the percentage of loss is very large, although they are more abundant than the otter. The Indians rely to a great extent on shooting them in very shallow water or on rocky ledges near shore.

On shore the Indians are very poor still-hunters, and luck and abundance of game are large elements in their success. Fur-bearing animals, such as bear, lynx, land otter, beaver, etc., are generally trapped, although shot whenever chance offers. Breech-loading arms are not allowed to be sold to the Indians. With the use of muzzle-loaders we find such necessities in the outfit of a hunter as Figs. 140*a* and 140*b*, which are powder-chargers of bone, and Fig. 140*c*, which is a percussion-cap box made from the horn of a mountain goat.

Deer.—Deer are very abundant, and form a large item in the food supply of the region. They are hunted in the rutting season with a call, which lures them to the ambushed hunter, when they are readily shot. So effective is this call, that it is not unusual to be able to get a second shot at them in case of first

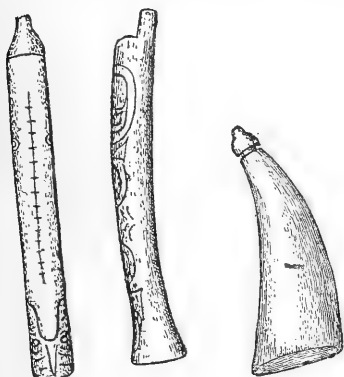


Fig. 140 *a b c*.

POWDER HORN AND CHARGERS.

(Tlingit. Emmons Collection.)

failure. Still hunting is very little resorted to, and an Indian seldom risks wasting a charge until he is somewhat sure of his distance and chances. They are often captured swimming, and in winter recklessly

slaughtered for their hides when driven down to the shore by heavy and long-continued snows. The deer-call is made from a blade of grass placed between two strips of wood, and is a very clever imitation of the cry of a deer in the rutting season. The wolves play great havoc in this region with the deer, and it seems remarkable that they exist in such numbers with so many ruthless enemies.

Mountain goats and sheep.—On the mainland these are shot with very little difficulty if one can overcome the natural obstacles to reaching the lofty heights which they frequent.

Bears.—The brown and black bear are the two species quite generally found in Alaska. Both are hunted with dogs, shot when accidentally encountered, or trapped with dead-falls. The brown bear (*Ursus Richardsonii*) is from 6 to 12 feet long and fully as ferocious as the grizzly. The hair is coarse, and the skins, not bringing a good price, are generally kept by the Indians for bedding. This fact, coupled with the natural ferocity of this species, has led to the brown bear being generally let alone. An accidental meeting in the woods with one of them is regarded as a very disagreeable incident by an Indian. When women and children run across bear-tracks in the woods, in deference to a generally recognized superstition, they immediately say the most charmingly complimentary things of bears in general and this visitor in particular. Petroff gives the origin of this custom as follows:

The bear was formerly rarely hunted by the superstitious Thlinkit, who had been told by the shamans that it is a man who has assumed the shape of an animal. They have a tradition to the effect that this secret of nature first became known through the daughter of a chief who came in contact with a man transformed into a bear. The woman in question went into the woods to gather berries, and incautiously spoke in terms of ridicule of the bear, whose traces she observed in the path. In punishment for her levity she was decoyed into the bear's lair and there compelled to marry him and assume the form of a bear. After her husband and her ursine child had been killed by her Thlinkit brethren, she returned to her home in her former shape and narrated her adventures.*

This legend is found in other forms throughout the coast, and occasion will be taken in another chapter to comment on it further. In conclusion, it may be said that the brown bear are expert fishers and frequent the streams in the salmon season along their well-beaten tracks, which form the best paths through the woods.

The black bear (*Ursus americanus*) is, on the other hand, rather timid and eagerly hunted, not only for his valuable black skin, but for his flesh, which, when young and tender, is very palatable. In the spring they are readily killed along the edge of the woods, when they come out to feed on the first sprigs of skunk-cabbage and other plants brought out by the warm sun. Later in the summer they are found along the streams, where they feed on the dead and dying salmon.

Taking it altogether, the Indians are expert fishermen but poor hunt-

*Petroff's Report, p. 168.

ers, indifferent marksmen, and wanting in that coolness and nerve for which the hunting Indians of the interior are famous. Besides the animals hunted for their skins as mentioned, there may be added the fox, wolf, mink, marten, land-otter, and an occasional Canada lynx and wolverine on the mainland. The method of dressing the skin is not different from that of the interior Indians, so generally described in works of travel. The skin scrapers or dressers are either of stone or bone, and of the pattern shown in Fig. 79 *h*, Plate xx and Fig. 79*k*.

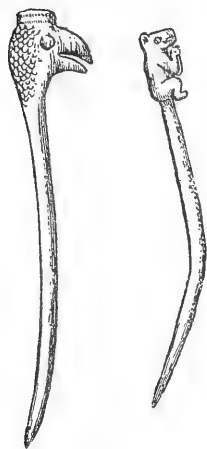


Fig. 145 *a*, *b*.

BONE TRAP-STICKS.

(Tlingit. Emmons Collection.)

Ermine and marmot.—In Figs. 145 *a* and 145*b* are shown two bone trap sticks, to which are fastened the sinew nooses used in the capture of ermine and marmot. Those for ermine are somewhat smaller than those shown in the figure. They are, moreover, sometimes made of wood instead of bone, and are elaborately carved in totemic designs. These two specimens are from the Emmons collection.

VI.

LAND-WORKS, HOUSES, VILLAGES.

Dwellings in general on the northwest coast may be classed as the fortified and the unprotected. These may be either temporary or permanent.

LAND-WORKS: FORTIFICATIONS.

In the past century, the form, location, and construction of villages have undergone considerable change in this region. The rules or practices of war were such as to entail the necessity for some form of fortification. Often, in addition to the regular villages, fortifications were erected near by, into which they might withdraw in time of danger, but sometimes fortified sites were permanently occupied. Before the advent of the whites, two considerations of prime importance obtained in the location of a site for a village, (1) proximity to halibut banks and fishing grounds, and (2) possibility of fortification against attack. Vancouver says of the Kake villages, at the head of Keku Straits, Kupreanoff Island:

They all uniformly were situated on the summit of some precipice, or steep insular rock, rendered by nature almost inaccessible, and by art and great labor made a strong defense, which proved that the inhabitants had been subject to the incursions of hostile visitors. These fortified places were well constructed, with a strong platform of wood, laid on the most elevated part of the rock, and projecting so far from its sides as to overspread the declivity. The edge of the platform was surrounded by a barricade raised by logs of wood placed on each other.*

In the narrative of Dixon's voyage (1787) a sketch is given of a Haida fortified house on Hippah Island, off the west coast of Queen Charlotte Islands. He says of it:

The tribe who inhabit this *hippah* seem well defended from any sudden assault of their enemies, for the ascent to it from the beach is steep and difficult of access, and the other sides are well barricaded with pines and brushwood, notwithstanding which they have been at infinite pains in raising additional fences of rails and boards, so that I should think they can not fail to repel any tribe that should dare to attack their fortification.*

Captain Dixon further pronounces it as "built exactly on the plan of the *hippah* of the savages of New Zealand."†

Strong natural defensive positions seem to have been generally selected along the whole coast. Vancouver (1793) notices this point

* Vancouver, Voyage, Vol. III, pp. 289, 290.

† Dixon, Voyage, p. 206.

among the Bilqula and Kwakiutl.* These were noticed by Mackenzie in the same year in the same localities.†

Dunn states (1834) of the Sebassa (southern Tsimshian):

They built their villages chiefly upon high and precipitous rocky islands or promontories, having steps cut down to the water. This is done to prevent any sudden attack from the enemy.‡


The skill of the Indians in erecting fortifications is well illustrated by Lisiansky (1804), who aided Baranoff in reëstablishing the Russian settlement at Sitka after the massacre. In *Voyages*, page 163, Plate II, is given a detailed plan and sketch of the palisade fort erected by the Sitkas. It is unnecessary to reproduce it here, but in structure and design it would have done credit to European ingenuity of that date. Langsdorff (1805) describes the fortifications erected a year later by the Indians expelled from Sitka as follows:

They have fortified themselves here upon a rock which rises perpendicularly to the height of some hundred feet above the water. * * * The rock itself is secured against the attack of an enemy by a double palisade of large trunks of trees stuck close together, measuring from 12 to 15 feet in height, and from 3 to 5 feet in thickness. A natural wall of earth, beyond the palisading, on the side towards the sea, conceals the habitations effectually, so that they can not be discerned by any ship.§

The only possible access to this fortification is described as on the northwest side, but the approach was strewn with very large trunks of trees to make it additionally difficult of access.

TEMPORARY DWELLINGS.

In summer camps, in hunting and fishing, and in canoe trips, the form of dwelling is temporary in construction.

Summer fishing camp.—Near the mouth of some fresh-water stream owned by a household or family, where the salmon run thickest, a roughly-built house will generally be found. This varies in size and care of construction according to circumstances. Usually the frame is light, and the roof, instead of being made of split boards, is formed by broad strips of bark which are laid on thus , and held down by stones and cross pieces. The larger kind have a smoke hole, but usually the fire is built outside, where the smoke assists in curing the strips of salmon and halibut hung on frames above it.

Tents.—The primitive form of tent for traveling consisted simply of strips of bark carried in the canoes. To erect the tents two saplings or branches would be cut, pointed, and stuck in the ground, forked ends up, with a cross pole resting in the forks. The bark strips would then be rested against the pole, forming a sloping wall towards the wind. This half-open tent was airy in form, but would shed the water of a driving rain. The fire was usually built in front. To-day the Indians

* Vancouver, *Voyage*, Vol. II, pp. 272, 274, 284.

† Mackenzie, *Voyages*, p. 345, *et seq.*

‡ Dunn, *Oregon*, p. 274.

§ Langsdorff, *Voyages*, Pt. II, pp. 128, 129.

use cotton sheeting for a cover in the form of an A tent. Along most of the water-courses where there is much travel the frames may be seen left standing near the good camping spots. These latter are selected from their having a good beach to haul up the canoes, fresh water near, unexposed position and proximity to good hunting ground. The cotton sheeting is stretched taut across the frame and the edges pegged into the ground. This form of tent was also used in primitive times, mats of cedar bark fibre or skins of animals forming the tent walls. At these camp sites are often deposited piles of wood already cut for use. In the short winter days it often happens that a belated canoe load arrives after dark. Here they find wood already cut, and they build a fire and warm up without the necessity of searching in the dark or in the snow for firewood. It is part of the unwritten code that an Indian using such firewood must in the morning replace what he has used by a similar amount gathered at his leisure before setting out again on his journey.

HOUSES.

The permanent houses are similar in form and type throughout the coast, but reach their highest development amongst the Haida. North, the Yakutat dwellings are but little better than the summer dwellings of the Haida, while to the south the houses are equal in size but inferior in artistic construction. In general, houses may be divided into three classes: (1) those built on the surface of the ground; (2) those built on a foundation of logs or slightly raised platform; (3) those raised on high logs or stilts.

Raised houses.—The last named are found amongst the Kwakiutl and Bilqula, and their primitive form of construction is fully described in Mackenzie, *Voyages*, p. 329, and Vancouver, *Voyage*, vol II, pp. 268, 272, 274, and 284. They both visited this region in 1793. According to Vancouver, amongst the Kwakiutl of Johnstone Strait, there were dwellings “raised and supported near 30 feet from the ground by perpendicular spars of a very large size” with “access formed by a long tree in an inclined position from the platform to the ground, with notches cut in it by way of steps about a foot and a half asunder.* This, however, was only one of several styles of their dwellings. In general, they were ornamented in front, at the gables, and above the doors, as now, with hieroglyphic drawings of their totems.

Tlingit dwellings.—Amongst the Tlingit, the permanent dwellings are as a rule built on a slightly raised foundation of logs, the approach to the doorway being by three or four raised steps with a platform in front of the door of the principal houses. This latter is the loafing place, and where the gamblers congregate for their incessant gambling bouts. This form of construction is by no means universally adopted, as some of the dwellings are built on the level of the ground. In any case, the

* Vancouver, *Voyage*, vol. II, p. 274.

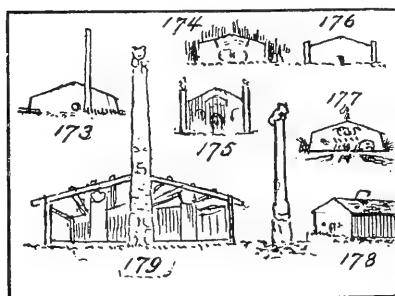
level of the door-sill is about that of what may be called the ground floor. Entering the door, one stands on a platform about 6 feet wide, running around the four sides of the house. Next, one steps down about 3 feet upon a ledge the same width, also running around the four sides. The next level, 3 feet below this, is the solid ground, sometimes bare, sometimes with a board floor. In the center of this the fire burns, the smoke ascending through a square smoke-hole in the roof in the center of the building. All houses were formerly without windows, ventilation being secured by the door and the smoke-hole. If the house is built on the surface of the ground, the interior is excavated into a kind of cellar, the ledges being cut in the earth and covered by large hewn slabs of cedar. These ledges serve not only as sleeping and lounging places, but as shelves to deposit all sorts of boxes, utensils, etc., belonging to the family. In the Tlingit dwellings, the fire-place is usually boxed in with boards, and filled in with stones. When the house is built on the surface of the ground, one enters the door at the level of the ground, and descends to the lower floor inside. If the house is built on a raised foundation, the bottom floor or court is usually on the level of the outside ground. One mounts to the door, enters, and descends to the ground inside. Between these two types are slight variations in which the foundation of logs is not so high, and the interior is dug down only about 2 or 3 feet. Amongst the Tlingit, the interior platform at the level of the door-sill is sometimes divided into living apartments, or small state-rooms, so to speak. Lisianski (1804) describes the houses about Sitka as square in form and spacious, with openings all along the top about 2 feet in width to let out the smoke. The fire-place was fenced around with boards, the place between the fire-place and the walls being partitioned by curtains for the different families living in the lodge. There were board shelves fixed around inside of the room for the storage of boxes and utensils.*

The primitive form of construction is not materially different from that described and illustrated in Plate xxxv. The Tlingit form of front is shown in Fig. 176, a local characteristic being given to it by the vertical boards *a a* at each corner of the front as shown. Throughout the whole coast, it was somewhat the custom to ornament the fronts with painted representation of the totem of the chief occupant. To the south this was the general custom. Amongst the Haida, Tsimshian, and Tlingit, it was only occasionally practiced. In Plate xxxv various styles of house fronts are illustrated in connection with the typical method of house construction.

Fig. 173 is a chief's house at Fort Simpson, British Columbia. Fig. 174 is a Tlingit front at Tongass, Alaska. Fig. 176 is the general Tlingit type as described above. Fig. 175 is an ancient form of front, after a model from Sitka in the National Museum. Fig. 177 is a Kwakiutl front

* Lisianski, Voyage, p. 239 and 240.

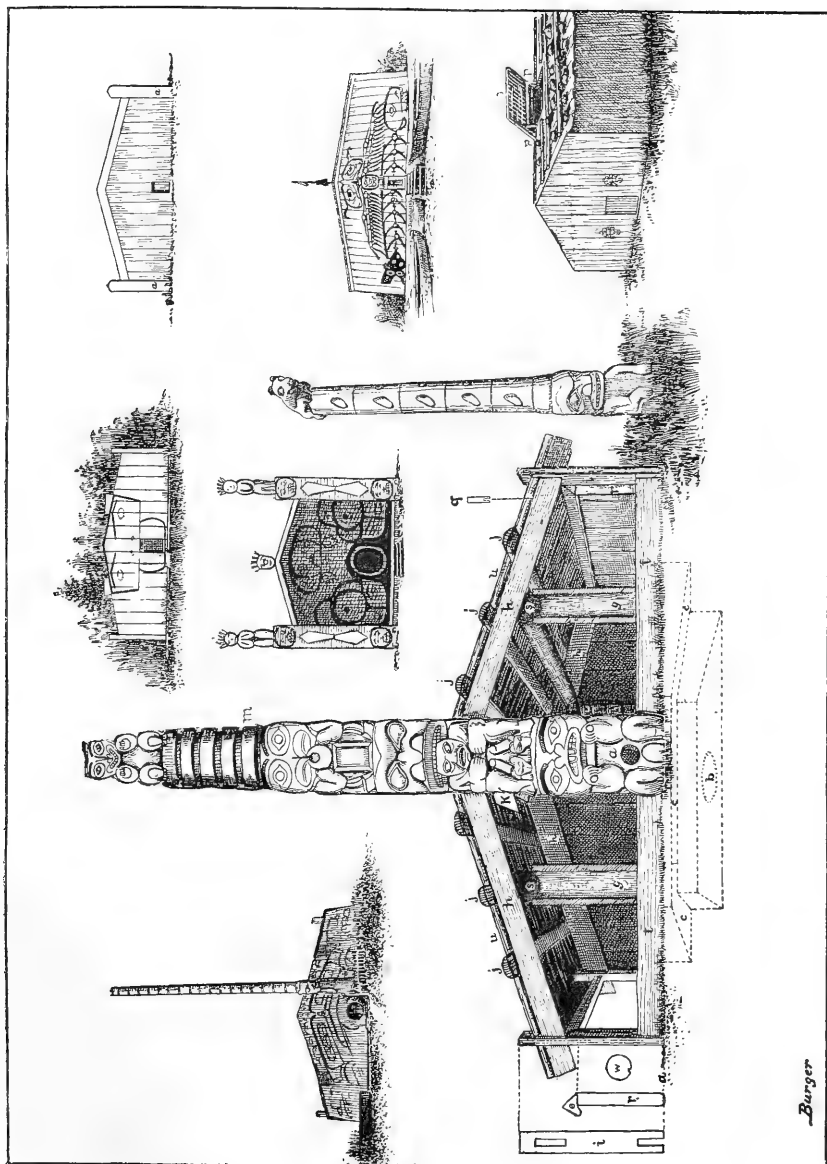
EXPLANATION OF PLATE XXXV.



DETAILS OF HAIDA HOUSE CONSTRUCTION, WITH TYPES OF FRONTS FOUND ELSEWHERE ON THE NORTHWEST COAST.

From drawings, photographs, and sketches.

- Fig. 173. Ornamented front painted to represent the eagle totem of a chief at Port Simpson, British Columbia (Tsimshian).
- Fig. 174. Ornamented front, painted to represent the wolf totem. Fort Tongass, Alaska (Tlingit).
- Fig. 175. Ancient form of Tlingit ornamented front, from a painting in the U. S. National Museum. Cat. No. 129776, U. S. N. M. Sitka, Alaska. Painted by James G. Swan.
- Fig. 176. General Tlingit type of front, with broad side-posts and rectangular doorway.
- Fig. 177. Ornamented front, after a sketch by Dr. Franz Boas (Kwakiutl.)
- Fig. 178. Details of smoke-hole, shutter, and method of roofing and holding down same with beams, rocks, etc. The totemic figures on each side of the doorway represent the eagle, and illustrate a style of totemic ornamentation now found here and there among the Tlingit as a survival or modification of the former custom of painting the whole house front in totemic design.
- Fig. 179. Details of the Haida method of house construction as explained fully in the text. The sub cellar or excavated living-room is dotted in beneath the sketch, the fire-place being shown at *b*.



DETAILS OF HAIDA HOUSE CONSTRUCTION, WITH TYPES OF FRONTS FOUND ELSEWHERE ON THE NORTHWEST COAST.



after Boas. The Haida fronts are rarely ornamented with totemic representations.

Totemic and mortuary columns.—It is the custom amongst the Tlingit, Kaigani, and Tsimshian to erect carved columns in front of the houses. These usually stand some feet from the fronts. Amongst the Haida they are generally in contact with the front, the doorway or entrance being through a hole in the carved column about three feet from the ground, into which the occupant appears to dive when he enters. This form of entrance is shown in Plate XXXV, and is found occasionally elsewhere, but is rather peculiar to the Haida. It is now, however, being generally superseded by the European type of doorway. The carved columns will be described in detail in a subsequent chapter.

Haida permanent dwellings.—Fig. 179, Plate XXXV, represents a Haida house of the conventional pattern. The posts, *g g*, hollowed out on the backs, as shown, to reduce the weight, with carved faces, are firmly planted in the ground. The upper ends are also hollowed to receive the enormous log plates, *s s*, which give strength and solidity to the building. The carved column, *m*, at the front of the house, is usually next erected, as the work up to this point requires the co-operation of many hands, the gathering being the occasion of a feast and a grand distribution of presents (a potlatch, as it is called) amongst the participants. Often, through lack of funds, the work of building a house has to be postponed, the whole process often requiring several years. The expenses are usually reckoned in blankets, as they are the conventional gifts on such an occasion. The huge plates and purlines, the hewn cedar planks, and the logs for posts and carved columns, are gotten out from the forests with great labor and expense, and are towed to the village site, where they are hauled up on skids, and the work of smooth-finishing begun. Plate LXX illustrates an animated scene at Fort Simpson, British Columbia, where a party of Haida are represented as hauling up a log on skids in the process of house construction. The relief carving on the totemic columns and the posts is done either by the owner, if he be expert, or if he be rich, by others hired or kept in the establishment for the purpose. The materials being ready, the invited guests assemble from far and near, and the different timbers are gotten up to the site of the house. The posts are raised into position by means of rope guys and props, and firmly planted in the deep holes dug in the ground. The plates or huge logs which rest on the uprights are gotten into position by what a sailor would call technically skids and parbuckles. To describe the process in detail, imagine the four posts (or, as in Plate LXX, six posts) in Fig. 179 firmly planted in the ground, their heads being hollowed out as shown. The log (or plate, as it is technically called in architecture) is rolled to a distance of about 14 feet from the uprights and parallel to its final position. The uprights are braced or shored on the opposite side, while on the adjacent side skids are rested at an angle to form an incline, up which the plate is, by the combined effort of many,

gradually rolled. Ropes are rove over the top of the posts under and over the plate, then back again over the upright. These ropes constitute the parbuckle, which is designed to take the weight of the log and hold it in position. Forked sticks are rested against the log with their other ends in the ground to help the parbuckle take the weight as the plate is gradually rolled up, the forked sticks being gradually also shifted up as it rises. By dint of pushing, shoving with poles, and pulling on the parbuckle, the plate is gotten to the top of the incline. It is now a question of lifting the dead weight of the log by means of poles and by pulling on the parbuckle. At last the plate is hauled to the top of the upright and rolled into the hollow in which it rests. The carved totemic columns are raised into position by means of poles, props, and rope guys, and firmly imbedded in the deep hole dug for it in the ground. The whole process is an occasion of much ceremony, and the work occupies but a small part of the time, the remainder being filled in with gambling, dancing, feasting, singing, speech-making, and ceremonial display intended to inspire the visitors and guests with the wealth and prowess of the host. Judge Swan says:

The self-denial of comforts and even necessities exercised for many years in the accumulation of property by man and wife is very remarkable, but, in their estimation, is amply repaid on the occasion of a distribution of the same and the erection of a decorative column, which in many instances stands in front of an unfinished lodge frame as a visible monument of the owner's folly and extravagance. * * * The owner probably lives in the lodge of some relative, or perhaps is dead. It has been beyond his means to finish his house, but for that he cares little; his vanity has been gratified; his pride satisfied. On the day when he stood presiding over his piles of goods and chattels, previous to their distribution amongst his eager and expectant guests, he had reached the summit of his ambition. * * * He is thenceforth a petty chief of the village.

In some of the very latest types of the houses, instead of the corner posts *ii* and the smaller posts *rr* supporting the eaves-plates *ee*, there are four posts and two heavy rafters similar to *g* and *s*. In either case the eaves-plates *e*, or one similar to *s*, are beveled to receive the upper ends of the boards forming the side walls of the house, as shown in *w* and adjacent details. The heavy plank frames *hh* and *tt* are beveled, as shown in section *q*, to receive the boards forming the end walls, or front and back of the house. The top purlines *jjjj* form the supports for the roof-planking, and are held in place by the superimposed frames *uu*. The roofing is formed either of planks or slabs of bark held down by rocks, beams and cross-pieces, as shown in Figure 178. The smoke-hole *k* is surmounted by a frame *pp* carrying a shutter *o*, which is closed in the direction of the wind. This shutter has a motion about the axle *pp*. When the wind changes and blows down the smoke-hole, a chain or rope is pulled and the shutter revolves to the other position against the wind. As the house faces the channel, and the wind usually draws up or down it, the shutter works to face one side of the house or the other. The entrance is shown at *a*. Below, the sketch of the house is dotted in the form of the excavated interior. The upper ledge or plat-

form is at the level, *d* ; *c* is the lower platform. The fire, *b*, burns on the bare earth, or in a frame-work of boards filled with rocks. It is here that the family sleep in winter, stretched out on the bare floor or on mats with feet towards the fire. As stated, the occupants of such a house are numerous, amounting in some cases to thirty or forty in all, and the household may embrace a chief, his family, grandchildren, and the families of several of his brothers. Amongst the Kaigani most of the houses are built on log foundations, a little above the ground, and the European form of door is used. In some cases the carved column is set a few feet off with a small opening in it, but the real entrance to the house is by a doorway, thus keeping up a semblance of the ancient custom. The Haida houses are quite generally excavated, and seldom built on raised foundations. The smaller houses, and not unusually the more modern houses, consist principally of a frame erected on four posts, one at each corner.

VILLAGES.

The villages are invariably situated along the shore, and usually near a shelving beach, which admits of easily hauling up the canoes. Often, through the desire to be near a good halibut fishing bank, a very exposed site is of necessity selected. The houses are usually in a single row, a few feet above extreme high water, facing toward the beach and not far back from it. At high water the canoes can be hauled well up. Between the houses and high-water mark is a space which serves as a street, with a beaten path near the houses and patches of grass beyond. This space serves for hauling up canoes for long periods and drying fish, as well as the usual purposes of a street. Sometimes the two rows of houses are built, where the space is contracted, with a narrow street between the rows. The houses are not very far apart in the rows, are often in contact, and arranged without regard to rank or precedence. There are one or more carved columns in front of each house. These are at first usually painted (formerly daubed with ochre), but the coat is seldom renewed. Owing to the bleaching effect of the weather, the columns and houses after a while assume a grayish white appearance, and become covered with moss. In the weather-cracks moss and vegetation flourish, giving a very ancient appearance. At the end of the village is the graveyard, with its variety of sepulchres and mortuary columns of ancient and modern form, as shown in Plate III. Scattered throughout the villages, in front and near the corners of the houses, are the mortuary or commemorative columns similar to those in the graveyards. These are pictured in all their variety in Plate III.

Behind the village, or at one end, are the small sheds in which the dead are placed.

Names of villages.—Considerable confusion has originated in the enumeration of villages amongst the Haida and Kaigani by Europeans, through the different names assigned to the same village. The Indians

have their own names, but the traders and others often call a village after the name of the chief; for instance, *Kasa-an* is popularly called Skowl's village; the village of Skidegate, Queen Charlotte Islands, British Columbia, is popularly so called from the name of the hereditary chief; the Haida name is *Hyo-hai-ka*, but the Tsimshian call it *Kil-hai oō*. *

Groups of villages.—Each village practically constitutes a tribe. There never have been any permanent leagues or associations of villages to constitute a nation with head ruler, although, for certain reasons of defense or offense, villages have so co-operated temporarily for mutual benefit or protection. The totemic systems of the Tlingit, Haida, and Tsmishian kings, in some senses uniform, have often operated to make the alliance between phratries and totems of different villages in some measure stronger than the clannish feeling due to close ethnical affinity.

Residence.—During the summer but few Indians are found at the permanent villages. Occasionally a canoe load returns to deposit a cargo, or to get something needed in the distant summer camp. Where the fishing and hunting ground is near the village, it is continually occupied, but if at a distance there are times when the village is entirely abandoned, although there may be some camps quite near. Under such circumstances property is entirely safe. Early in the summer, during the first run of salmon, and when birds' eggs are to be gathered, the Indians are widely scattered. Later on they congregate, but disperse again for the run of King salmon, which lasts well into December. By Christmas time they have all gathered in, and in the long winter nights take place all those social and ceremonial gatherings and feastings of which only a winter's residence amongst them can give an adequate idea. Gathered around the blazing fire then are related those legends and traditions which illustrate their beliefs. Then also take place those dances, ceremonials, and theatrical performances which graphically illustrate and perpetuate these traditions, and glorify the prowess and might of the chiefs and their ancestors.

* Dawson, Report, B, p. 165.

VII.

ARTS AND INDUSTRIES—HOUSEHOLD UTENSILS—PAINTING, DRAWING AND CARVING—MUSIC.

While the Tlingit, Haida, and Tsimshian are essentially wood carvers, this is by no means their only talent. Out of the abundance of their resources they have not only adapted wood to their every need, but along with it have developed many other industries. They are, as well, expert carpenters, basket makers, weavers, and metal workers. Their tools are crude, but with them they accomplish the most surprising results. Along with the totemic system, we find the identification of the individual with his totem carried out in the carving or painting of his crest on every article of personal property. The simplest implement or utensil is ornamented with some pictograph relating to the legends of the totem to which he belongs. Tattooed on the body, woven into fabrics, etched on the metal bracelets and ornaments, painted on the house fronts, drawn on the canoe outfits, emblazoned on the household boxes, carved on the huge columns—commemorated in metal, wood, and stone; the totem of the Indian is his earliest and latest care, yet it is all subservient to the ever-recurring struggle to live. In the circuit of the seasons a regular routine of duties is observed. In the time not devoted to hunting, fishing, and the procurement of food the various arts and industries are practiced. In the summer camp odd hours are spent in cutting down trees, collecting furs, bark, and grasses, roughing out lumber, and in general collecting the raw materials, which, in the winter's leisure, they convert into the various implements, utensils, and finished products for their own use and for trading purposes.

Raw materials.—Various kinds of grasses are gathered, and after being dried, are dyed and trimmed to finished dimensions. Spruce roots are boiled until they become pliable, beaten with sticks, and the fibres picked into threads. The cedar bark gathered for industrial purposes is from the inside of the outer bark, that for food being scraped from the trunk itself. The former is soaked in water for several days, then beaten to make it pliable enough to enable it to be stripped into shreds. Fig. 179/ is a bone bark-scaper used in removing the bark from trees, in scraping it down, and in the preliminary process

of hackling it, which, with the beating it receives from a bone mallet such as shown in Fig. 179m, separates it into fibres. These two specimens are in the Emmons Collection.

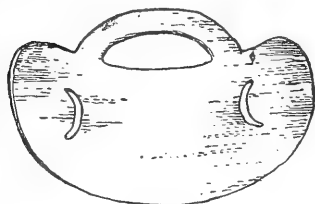


Fig. 179l.

BARK SCRAPER.

(Tlingit. Emmons Collection.)

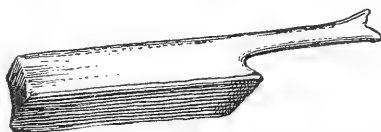


Fig. 179m.

BARK BEATER.

(Tlingit. Emmons Collection.)

Other kinds of vegetable fibre, such as wild nettle and a species of wild hemp, are beaten on the rocks, shredded, and spun with a rude distaff and spindle into a strong twine or thread. Wood for canoes, houses, columns, paddles, dishes, masks, helmets, spear-shafts, arrows, floats, hooks, etc., is also gotten out during the summer season and roughly worked up in camp, the finishing being often left for winter leisure. At this time also the trading is done to obtain supplies of cloth, horn, copper, shell, etc., for the accessories of costumes for ordinary and ceremonial occasions. Fibre of cedar bark, hemp, and goat's wool are spun into threads for use in weaving the blankets for which certain tribes are famous.

Ropes and cords.—The simplest cords or lines are those of kelp, sometimes single, sometimes laid up into two or more strands for additional strength, as rope. The neatest ropes and cords, however, are made from strands of spruce root or bark fibre, the small stuff being dexterously twisted between the hand and thigh. The cordage for raising large timbers and columns is regularly laid up and twisted like our own ropes. A few of the most important uses to which the different varieties of native cordage are put may be enumerated as follows: Warp for blankets, fishing lines, canoe anchor lines, sheets for sails, lashings for boxes, grommets for heads of chisels and wedges, head-dresses, girdles, guys for erecting columns, and dipping lines for turning the smoke-hole shutters of the houses.

Mats.—These are made principally of bark and are used for bedding, for sails, and as covers for canoe cargoes. The coarser kinds are thrown over the canoes to protect them from the weather and as screens for building temporary camps at night in traveling. The use of mats, however, for sails and tents has given place to the substitute already mentioned—cotton sheeting. Amongst the Tlingit, on ceremonial occasions, the chiefs were carried on mats borne by the slaves from the canoes to the houses or in embarking in state. Matting from the different parts of the northwest coast can be distinguished by the pattern and texture. The method of weaving is that shown in Fig. 38e, Plate XII.

In general, the mats of the southern Indians are made of soft, red, pliable cedar bark, while those of the northern are stiffer, coarser, lighter in color, and bordered with black strips interwoven into the texture of the fabric.

Baskets.—The most expert tribes in basket making are found at the extremes of the northwest coast. In the south the Makah excel all others; in the north the Chilkat. The method of weaving is, however, radically different. Amongst the Makah and other tribes of the Wakashan stock the pattern is that shown in Fig. 168, Plate XXXII, described by Prof. O. T. Mason as follows:

It may be called the "fish-trap style," since without doubt the finer basketry is the lineal descendant of the rude wicker fish-trap. Imagine a number of stakes driven into the ground pretty close together. A horizontal pole is laid against them in the rear, and by the wrappings of a withe around the pole and each upright stake diagonally on the outside and vertically on the inside a spiral fastening is produced. This stitch crosses the two fundamentals in front at an angle and the horizontal frame piece in the rear at right angles, or *vice versa*.*

Patterns in geometrical figures are worked on the baskets in black, yellow, drab, red, etc., in dyed straws. Amongst the Haida and the Chilcat and northern Tlingit generally the method of weaving basketry is by that known as "twining;" that is, twining two woof strands around a series of warp strands. This is illustrated in detail in Figs. 37c and 37d, Plate XII, which represent the same method used amongst these Indians for rain hats. Different varieties of Haida and Tlingit baskets are shown in Plates XXXVI and XXXVII, and Figs. 180 to 189, inclusive. Fig. 180 of the first-named plate represents a Tlingit "coiled" basket, of which Fig. 185 is another variety. This method of construction differs from the "twined" basketry. The bottom of this type is made of a number of straight rods sewed into a rectangular mat, around which the sides are built up by coiling. "The mat-like bottom is ornamented by sewing on straws longitudinally with stitches wide apart, so as to show a checker pattern of straw and stitching. This method of ornamenting the bottom is often pursued over the whole external surface of the basket."† Figs. 185 and 186 are from Professor Mason's article on basketry just quoted. Fig. 186 shows the method of covering up the coiled work of the sides by an ornamental arrangement of bark and straw. The concealed texture is "built up by whipping a coil of rushes or small splints with splint or birch bark. * * * The imbricated effect upon the surface is produced by sewing on little loops of bark and straw, white and brown, with blind stitches, in such a way as to conceal the manner of attachment."† (See Fig. 186.) Fig. 180 is a top view and Fig. 186 is a side view of this type of coiled basketry. Four styles of twined baskets of ornamental pattern

* Smithsonian Report, 1884, Part II, p. 297-298. Mason. Aboriginal Basket-work.

† Smithsonian Report, Part II, 1884. Mason. Aboriginal Basket-work. Plate VI.

are shown in Figs. 181, 182, 184, and 189. These are made from the fibre of the spruce root and so delicately twined as to be water-tight. The bottom is roughly made, the warp being of splints of spruce root radiating from the center, and the woof of twine woven in the plain

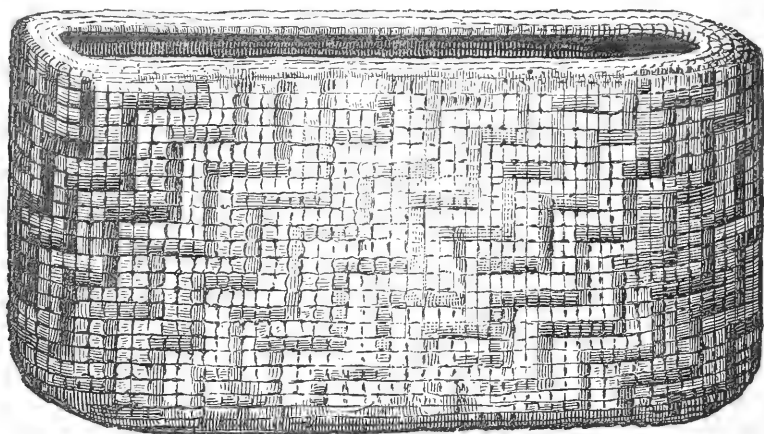


Fig. 185.

COILED BASKET.

(Cat. No. 60235, U. S. N. M. Tinné Indians, S. E. Alaska. Collected by John J. McLean.)

color of the material. The cylindrical portion above the bottom is also in the plain color of the spruce root, but the "twining" is that of Fig. 37c, Plate XII. Bands of red and black are woven into the structure for ornamental purposes, the strands being colored on both sides.

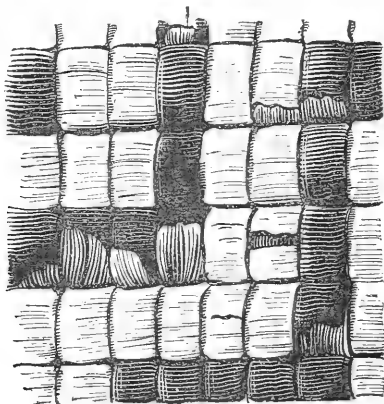


Fig. 186.

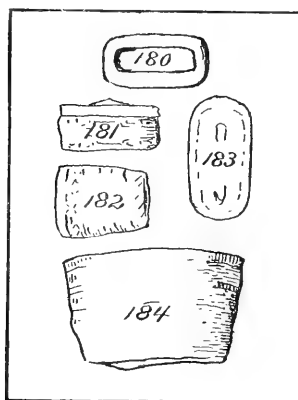
DETAIL OF FIG. 185.

"Afterwards little squares or other plain figures are sewed on in "aresene," that is, only half way through, giving the most varied effect on the outside, while the inside shows only the plain colors and the red and black bands."* In recent years the most gaudy and brilliant

* Smithsonian Report, 1884, Part II, Mason, Aboriginal Basket-work, p. 295.



EXPLANATION OF PLATE XXXVI.



TLINGIT AND HAIDA BASKET-WORK.

- Fig. 180. COILED BASKET. Made by whipping a coil of rushes or small splints with splints or birch bark to form the sides, which are built up on a mat-like bottom. The foundation work is concealed beneath an imbrication in loops of bark and straw sewed on with blind stitches. Collected at Hoonyah, but the work belongs to the mainland and the interior. Cat. No. 60235, U. S. N. M. Tinne Indians, Hoonyah, Alaska. Collected by John J. McLean.
- Fig. 181. TWINED BASKET. Of spruce-root. Geometric patterns worked on the outside with colored spruce-root and dyed wild wheat straw. Cover handle contains small pebbles to form a rattle. Method of twining shown in Fig. 37b, Plate XII. Cat. No. 20715, U. S. N. M. Tlingit, Alaska. Collected by James G. Swan.
- Fig. 182. TWINED BASKET. Same style as Fig. 180. Cat. No. 78442, U. S. N. M. Haida Indians, Queen Charlotte Islands. Collected by James G. Swan.
- Fig. 183. TWINED BASKET MAT. Of spruce-root. European pattern. Cat. No. 20727, U. S. N. M. Tlingit Indians, Sitka. Collected by James G. Swan.
- Fig. 184. TWINED WALLET. Cat. No. 1865, U. S. N. M. Chilkat Indians, Alaska. Collected by W. F. Tolmie.



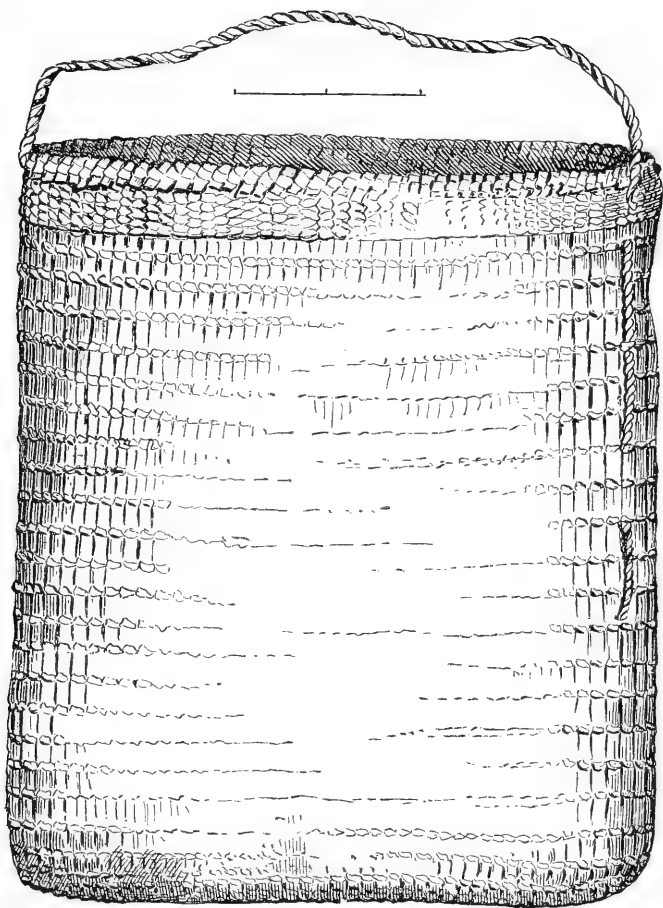
TLINGIT AND HAIDA BASKET-WORK.

EXPLANATION OF PLATE XXXVII.

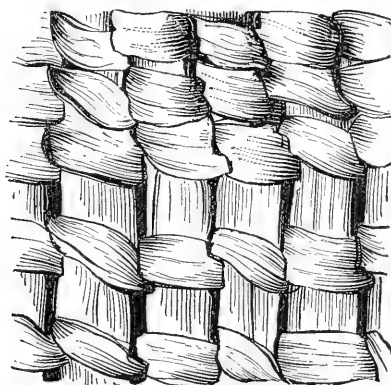
GENERAL TYPE OF HAIDA AND TLINGIT OPEN-WORK TWINED BASKETRY.

From Smithsonian Report, 1884, Part II, Plate VIII.

Fig. 190. The method of open twined weaving is shown in Fig. *b*. Spruce-root is used in this type in the north, but cedar-bark replaces it in the south. The handle is a twine of spruce-root fastened on by weaving in and out on the side, the lower end knotted. The fastening off at the rim is done by bending down the warp threads externally and sewing them flat with one row of twining. Cat. No. 88964, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



a



b

Fig. 190.

colored wild wheat straws are used in this relief ornamentation. The

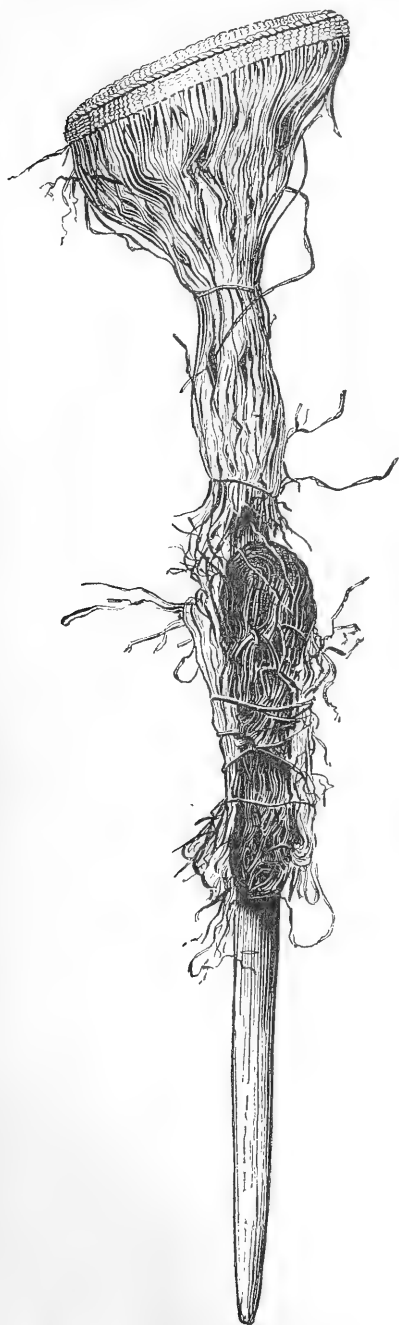


Fig. 187.

HAIDA BASKET, SET UP.

(Cat. No. 88956, U. S. N. M. Massett Indians, Queen Charlotte Island, B. C. Collected by Jas. G. Swan.)

borders at the top of the baskets are formed by turning under the warp threads and cutting them off. Circular covers, likewise ornamented, are fitted to baskets of the type of Figs. 181 and 182. These frequently have an ingeniously woven compartment in the top in which small pebbles are enclosed, and which rattle when shaken. Fig. 187 illustrates the method of making this style of basket amongst the Haida, taken from a sketch in Professor Mason's

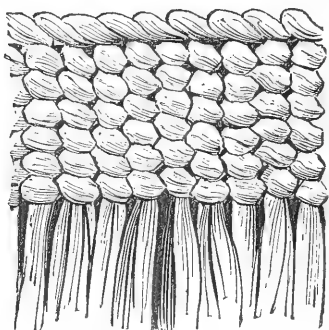


Fig. 188.

DETAILS OF FIG. 187.

article on "Aboriginal Basket-work" already referred to. Of it he says:

The method of manufacture of Haida twined basketry as shown by Mr. J. G. Swan in a specimen collected expressly for the National Museum (Fig. 187, No. 88956. Masset, Queen Charlotte Islands, British Columbia). Mr. Swan says: "This style of making baskets differs from that of Cape Flattery. There the women sit on the ground and weave baskets and mats, both of which rest on the ground. With the Haidas the mats are suspended on a frame and the baskets supported on a stick as in the figure. The black color of the spruce root used in making ornamental patterns is produced by soaking it in the mud. Fig. 188 shows the bottom of the basket made by the twining process. The border of the bottom is marked off by a row of double weaving or a twine built outside the body of the basket."*

* Smithsonian Report, 1884, Part II, p. 297. Aboriginal Basket-work, Mason.

The principal difference between the styles of baskets shown in Figs. 181 and 182 is in the size, the former being broader and flatter than the latter, which is about 9 inches deep and $6\frac{1}{2}$ inches in diameter. Fig. 184 represents a 12 by 12 inch twined circular basket made by the Chilcat Indians with embroidered design on the exterior. Fig. 189 represents a basket wallet of the same type as the above, but flattened into the shape in which they are usually carried. The colors used in the ornamentation are black and red. This style of basketry, as all others, is copied by the Haida, who, however, use gaudier colors and are not quite so expert as their northern Tlingit neighbors. The specimen illustrated in Fig. 189 is No. 21560, U. S. National Museum. Fig. 190a,

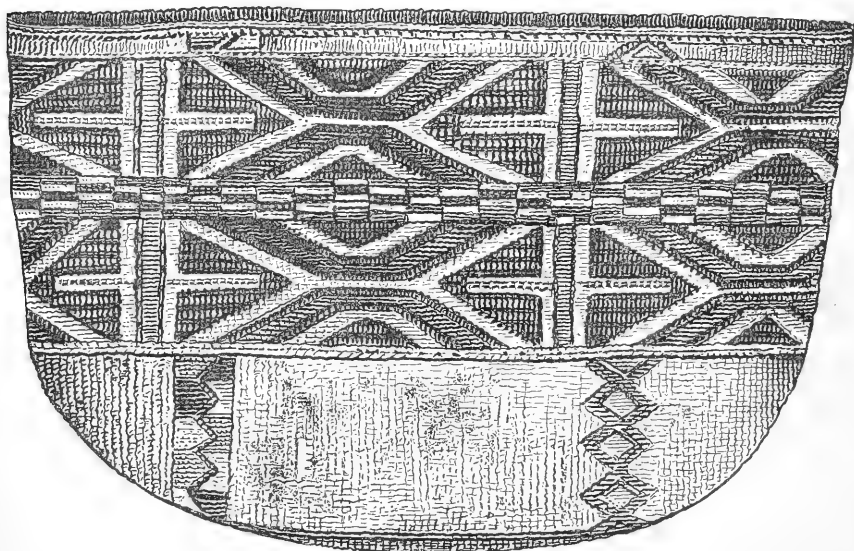


Fig. 189.

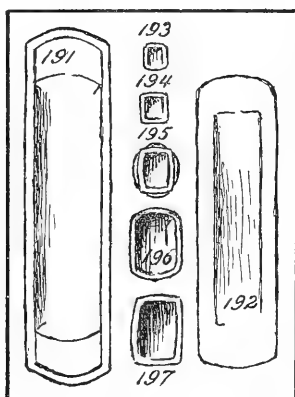
TWINED AND EMBROIDERED BASKET WALLET.

(Cat. No. 21560, U. S. N. M. Chilcat Indians, Alaska. Collected by Dr. J. B. White, U. S. A.)

Plate XXXVII, represents a general type of both Haida and Tlingit open-work twined basket, the details of the twine weaving being shown in *b* of the same plate. This is reproduced from Professor O. T. Mason's article on "Aboriginal Basket-work" already referred to.

Dishes.—In nothing more than in their wooden and horn dishes have these Indians been conservative. Portlock and Dixon (1787), Marchand (1791), and Lisiansky (1805), all describe the same types of household utensils as are found to-day in this region. A few of the general varieties of wooden dishes are shown in Plates XXXVIII, XXXIX, and XL. These are usually carved from blocks of spruce wood, ornamented with rows of shells, and have in more or less elaborate detail the totem of the owner etched or carved upon them. Often the carving represents some legend of the coast; again, a mythical animal. With regard

EXPLANATION OF PLATE XXXVIII.

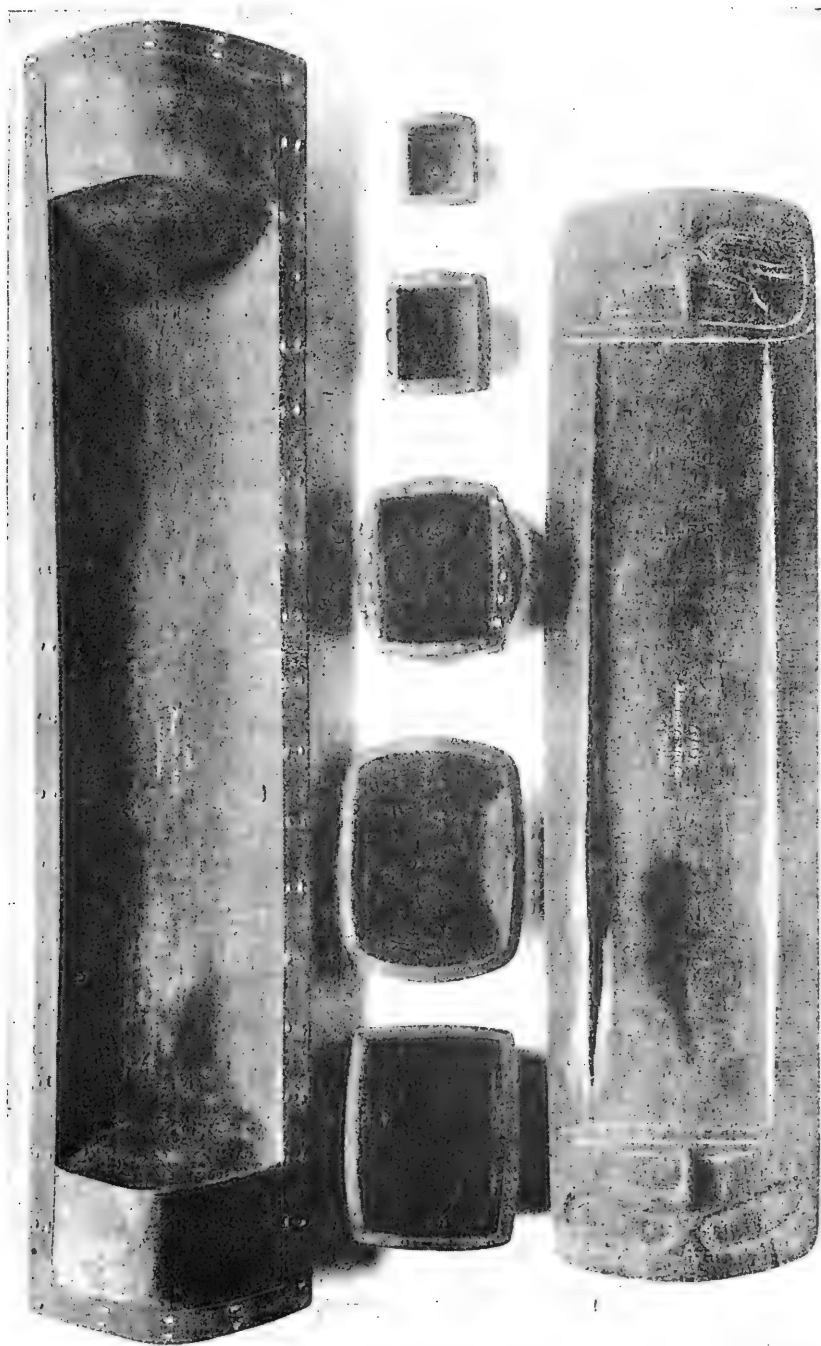


TLINGIT CEREMONIAL AND HOUSEHOLD FOOD-DISHES.

Fig. 191. FEAST DISH. A deep wooden trough used by the chiefs in the feasts accompanying their numerous ceremonials. The edge is inlaid with a double row of opercula and the ends faintly etched and painted in a totemic design in red and black. Cat. No. 60158, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.

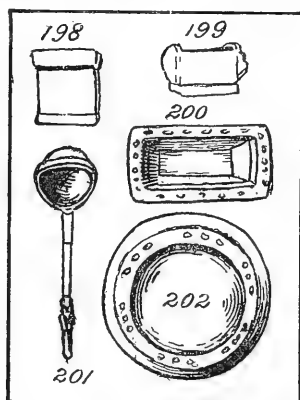
Fig. 192. FEAST DISH. Flat, shallow vessel of same character and locality as above. These are the extremes of feast dishes in depth, style of ornamentation, and shape. The carved figure on each end represents the eagle. These two types are found also amongst the Haida and Tsimshian. Cat. No. 60167, U. S. N. M. Sitka, Alaska. Collected by John J. McLean.

FOOD DISHES. Fig. 193, Cat. No. 74401; Fig. 194, Cat. No. 74425; Fig. 195, Cat. No. 74402; Fig. 196, Cat. No. 74414; Fig. 197, Cat. No. 74412. All from Tlingit Indians, Alaska. Collected by John J. McLean.



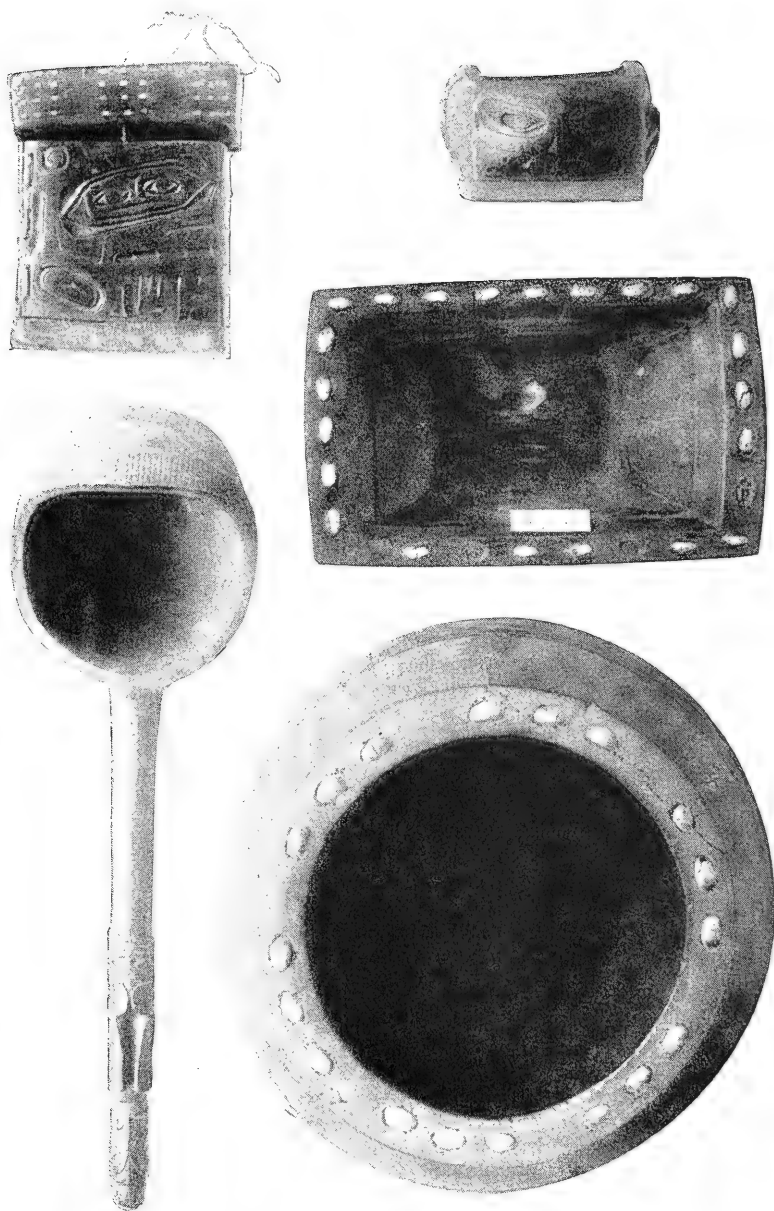
TLINGIT CEREMONIAL AND HOUSEHOLD FOOD-DISHES.

EXPLANATION OF PLATE XXXIX.



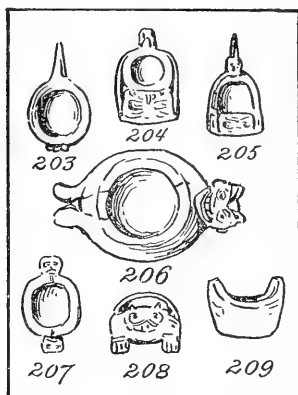
TYPES OF WOODEN HOUSEHOLD UTENSILS FROM THE NORTHWEST COAST.

- Fig. 198. TREASURE OR TRINKET BOX. Of wood, with ornamental top and handle of cord. Some of these boxes are as large as 2 by 3 feet. Cat. No. 60175, U. S. N. M. Hootznahoo Indians, Alaska. Collected by John J. McLean.
- Fig. 199. FOOD DISH. Wood, with rounded sides; totemic carvings. Side view. Compare Fig. 195, Plate XXXVIII. Cat. No. 89153, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 200. FOOD DISH. Ornamented with opercula. Compare Fig. 196, Plate XXXVIII. Cat. No. 67936, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.
- Fig. 201. LADLE. Cat. No. 60165, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 202. BOWL. Cat. No. 60165, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.



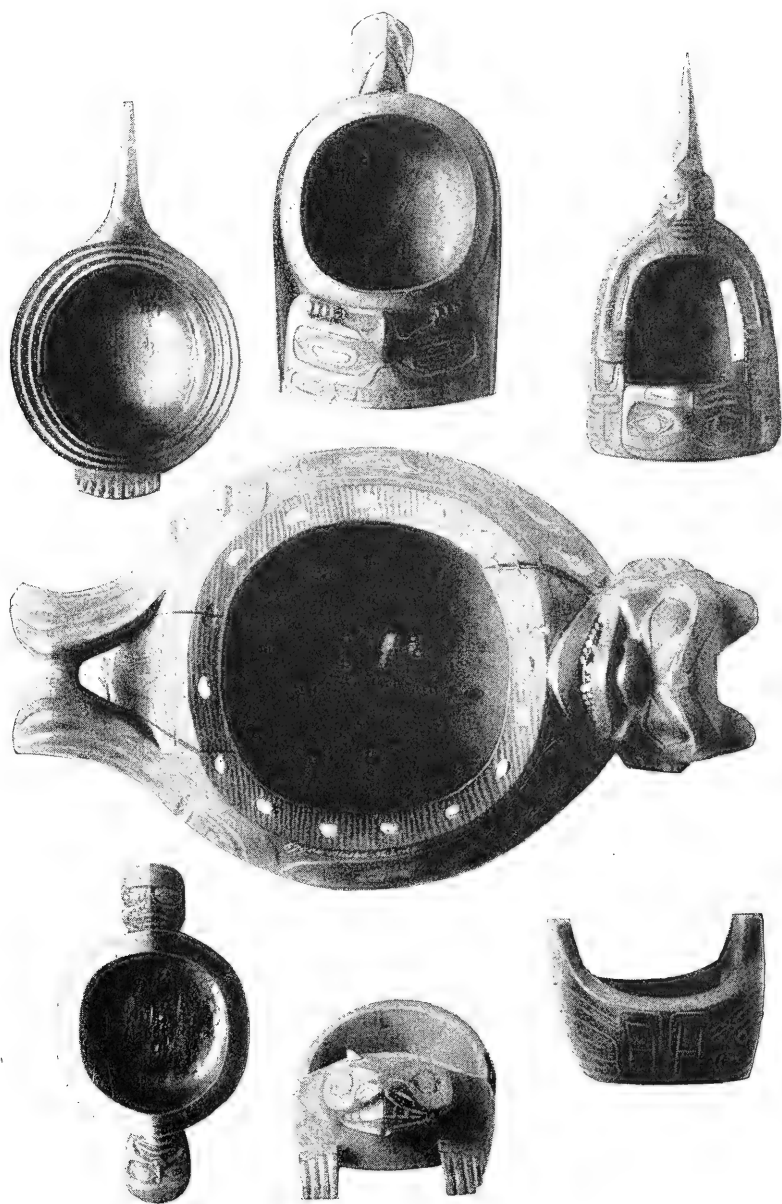
TYPES OF WOODEN HOUSEHOLD UTENSILS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XL.



FOOD-DISHES FROM THE NORTHWEST COAST.

- Fig. 203. OIL BOWL. Design, a sea-gull. Cat. No. 20856, U. S. N. M. Stikine Indians, Fort Wrangell, Alaska. Collected by James G. Swan.
- Fig. 204. BOWL. Design, Olalla, the mountain demon, and Kaltz-da, the crow. Cat. No. 89136, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 205. BOWL. Of wood. Design, a version of same legend as that of Fig. 204. Cat. No. 89134, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 206. FOOD DISH. Design, a seal and legendary carving. Ornamented with opercula of shells. Cat. No. 67902, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by John J. McLean.
- Fig. 207. BOWL. Of wood. Handles represent human faces. Cat. No. 20858, U. S. N. M. Stikine Indians, Fort Wrangell, Alaska. Collected by James G. Swan.
- Fig. 208. DISH. Of wood. Design, Tsing, the beaver. Cat. No. 89133, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 209. DISH. Design, Skam-son, the sparrowhawk. Cat. No. 88862, U. S. N. M. Haida Indians, Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



FOOD-DISHES FROM THE NORTHWEST COAST.

to the materials of which these native dishes are made, they may be divided into wooden and horn. In shapes they may be classified as boat-shaped, flat, square, round, spherical, oblong, and tub-shaped. They are all essentially food dishes, but one or two exceptions will hereafter be noted. In the large feasts given by the chiefs, ceremonial dishes are used, differing in size and character from the ordinary household variety. Figs. 191 and 192, Plate XXXVIII, represent the two extremes of this type of dish, the former being deep, painted in totemic design, and ornamented with opercula, while the latter is shallow and deeply carved but not otherwise ornamented. Figs. 195 and 199 represent another type of ordinary food dish with rounded sides and elaborate relief carving, the former being a top and the latter a side view. Other varieties are discussed in connection with the explanations of illustrations.

Fig. 198 is a carved wooden treasure-box. The larger boxes of this type are used for transportation, and storage cases for dog-fish oils, dried fish, and other food supplies, and are often as large as 24 inches in height by 14 inches in breadth. These must be distinguished from the household boxes used for the storage of goods and chattels. These latter are lighter and more beautifully carved and painted. The former are heavier and clumsier, and, although carved, are generally soiled with oil and grease. It is in this style of box that the Indians transport eulachon and other kinds of oil, grease, or fats in quantities of 100 pounds or more. The chests or household boxes are described in another paragraph. Boxes of a shape corresponding to Figs. 195 and 199, also used for food and supplies of grease, are often as large as 20 inches in length by 12 inches in height. Fig. 209, Plate XL, represents a tub-shaped dish, ornamented with a totemic design. A specimen of this kind in the U. S. National Museum measures 32 inches in length and 17 inches in extreme height. It may be noted in passing that these native wooden dishes are now being rapidly superseded by cheap earthenware purchased from the traders. Dishes and spoons have been made on the coast from the horns of the mountain sheep and goat from time immemorial. The Haida have excelled all others, however, in the art of carving in general and inlaying in shell, yet curiously enough they have to get the horn by trade with the Tsimshian and Tlingit on the mainland, as the goats and sheep are only found in the loftiest parts of the main coast ranges. Fig. 217 represents an end view of an elaborately carved Haida horn dish, of which a side view is not unlike Fig. 209. A top view of a similar dish is shown in Fig. 222. ~

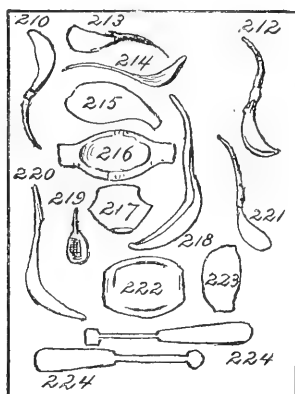
Spoons and ladles.—Plates XLI and XLII illustrate a sufficient variety of spoons to give an idea of how elaborately so simple a household article as this is carved and ornamented. The first mentioned plate shows a variety of horn spoons, Fig. 218 being a representative one in

point of size, although it is severely plain and unornamented. Looking at a horn of a mountain sheep it seems difficult to conceive how the Indians can get so large a spoon out of such a curled and unpromising looking object. The bowl of the spoon comes from the largest part; the handle runs the full length to the tip, and is afterwards straightened out by steaming it. In general, spoons are shaped by steaming in a wooden mould made in two pieces, and scored out inside to the required shape. This type of great horn spoon is usually elaborately and deeply carved in totemic design, and sometimes inlaid with abalone shell. They are preserved as heirlooms in the families and considered of great value. A not uncommon type of spoon is shown in Figs. 210, 212, 213, and 221, the bowl being from the horn of a mountain sheep and the handle a mountain goat horn, elaborately carved in a legendary or totemic design. The handle is very ingeniously secured to the bowl by a sort of tongue and groove rivetted through with copper. The significance of the carvings on the handles of those shown in the plate, as far as known to the writer, is given in the explanation of the figures. The spoons shown in Figs. 211, 214, and 219 are made entirely of the horns of the mountain goat, the bowls being formed by splitting the horn at the base and rolling it out flat by steaming and bending it. Fig. 220 is a plain sheep-horn spoon, similar in shape to the wooden one shown in Fig. 238. The long, flat putty-knife or spatula-shaped objects shown in Plate XLII are berry spoons, or ceremonial feast spoons, made of wood and carved or painted in totemic design. These are shown in different views, well illustrating the variety of shapes. Fig. 224 of the preceding plate represents a pair of spoons of this type carved from whalebone and obtained at Sitka, Alaska. A most elaborately carved pair of wooden ceremonial spoons in the collection resemble the orca or whale-killer. Other types of ordinary wooden spoons are shown in Figs. 233, 237, 238, and 239. Fig. 274, Plate LI, illustrates a wooden ceremonial spoon of enormous size found amongst the Haida, the bowl having a capacity of two quarts. This is used in the ceremonies attending the initiation of young men into the responsibilities of rank, when the novice must publicly drink to the last drop the contents of the bowl consisting of fish oil, without removing the spoon from his lips. The exact nature of this ceremony is not understood by the writer, but this use for such a large spoon has been explained to him by several people well versed in Haida customs. Fig. 201, Plate XXXIX, represents a carved wooden oil ladle or spoon.

Household boxes or chests.—These are for the stowage or packing away of ceremonial paraphernalia and the goods and chattels of the household. They vary in size and shape, as shown in Plate LI.

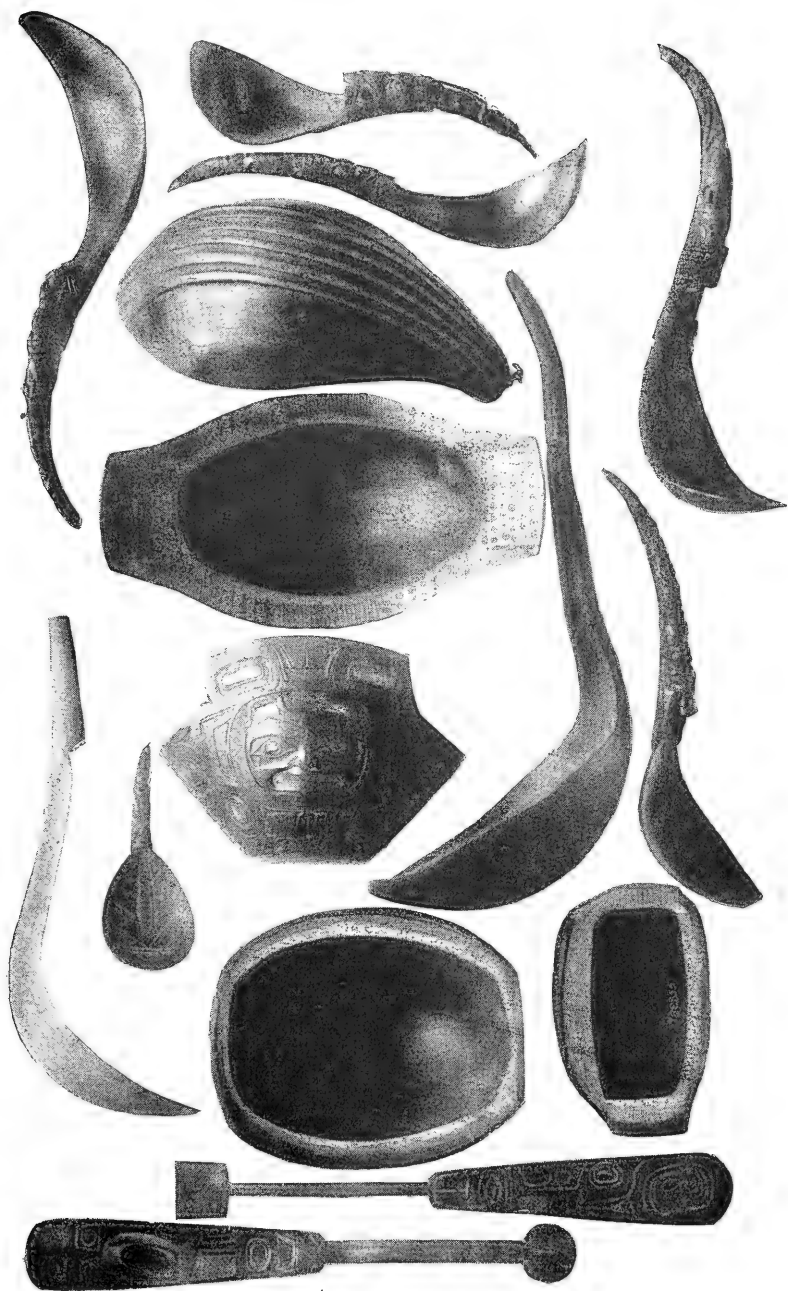
The oblong chests are simply great wooden boxes with heavy bottoms and peculiarly shaped lids. The sides of these are made either in two or in four pieces. When made in two pieces a thin wide piece of cedar is bent at right angles by means of hot water, forming a side and an end,

EXPLANATION OF PLATE XLI.



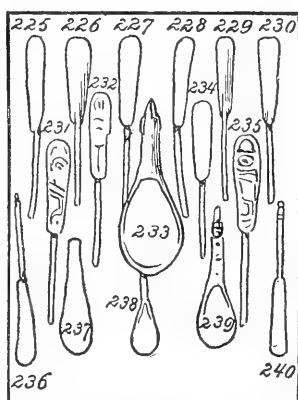
HORN AND WHALEBONE SPOONS AND DISHES FROM THE NORTHWEST COAST.

- Fig. 210. SHEEP-HORN SPOON. Handle of goat horn; totemic design: "The killer whale and the owl." Cat. No. 89173, U. S. N. M. Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 212. HORN SPOON. Totemic designs: "The bear and the hunter," and above, "The raven and the man." Cat. No. 89174, U. S. N. M. Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 213. HORN SPOON. Totemic designs: "The bear and the hunter," and "The mountain demon and the frog." Cat. No. 89165*b*, U. S. N. M. Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 214. HORN SPOON. Both parts of goat's horn. Cat. No. 88710, U. S. N. M. Masset, British Columbia. Collected by James G. Swan.
- Fig. 215. SHEEP-HORN DISH. Style of carving resembles that of Eskimo. No number. Sitka, Alaska.
- Fig. 216. SHEEP-HORN BOWL. Less artistic than those of the Haida. Cat. No. 75436, U. S. N. M. Tlingit, Sitka, Alaska. Collected by John J. McLean.
- Fig. 217. SHEEP-HORN BOWL. Carved and inlaid with haliotis. Cat. No. 20856, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 218. SHEEP-HORN BOWL. Made from a single horn by steaming. Cat. No. 88866, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 219. GOAT-HORN SPOON. Cat. No. 74697, U. S. N. M. Sitka, Alaska. Collected by John J. McLean.
- Fig. 220. SPOON. Of mountain-sheep horn. Cat. No. 74283, U. S. N. M. Collected by John J. McLean.
- Fig. 221. HORN SPOON. Legend: "The bear and the hunter." Compare 210, 212, 213. Cat. No. 89165*c*, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 222. SHEEP-HORN BOWL. Cat. No. 23400, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 223. SHEEP-HORN DISH. Cat. No. 88853, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 224. EATING STICKS. Of whalebone. Cat. No. 8944 (1 and 2), U. S. N. M. Sitka, Alaska. Collected by Dr. A. H. Hoff, U. S. Army.



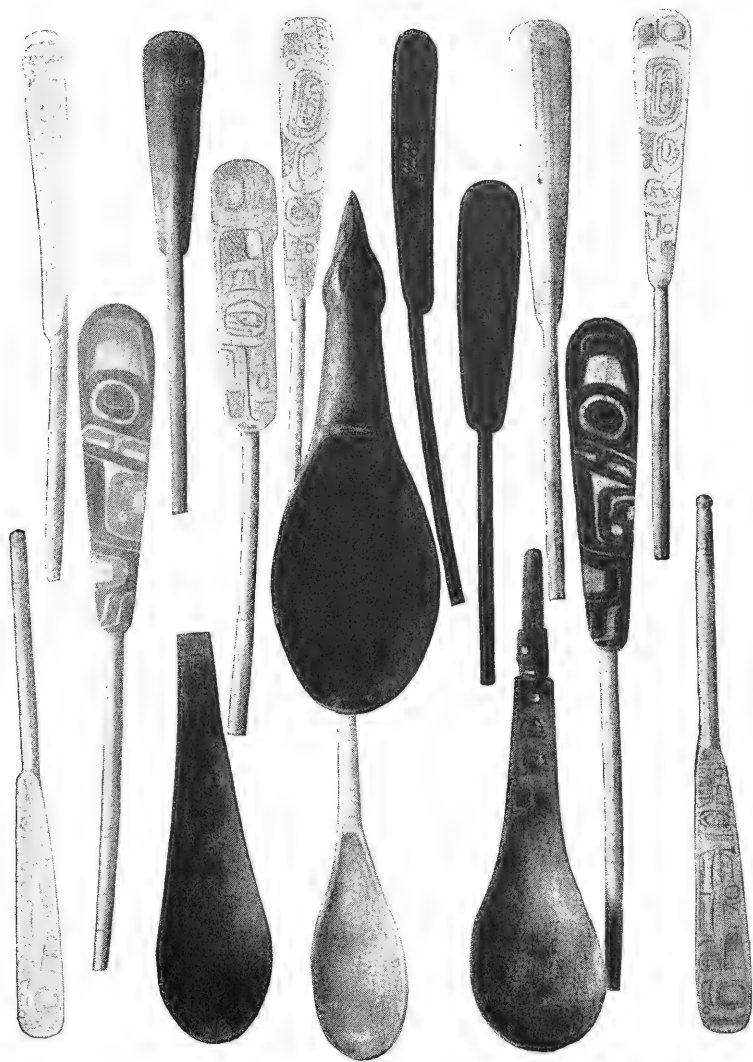
HORN AND WHALEBONE SPOONS AND DISHES FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XLII.



WOODEN SPOONS FROM THE NORTHWEST COAST.

- Figs. 227, 229, 230, 236, and 240. SPOONS. Of wood. Used especially for berries by all Northwest Indian tribes. Cat. Nos. 20820-25, U. S. N. M. Kake Indians (Tlingits) Alaska. Collected by James G. Swan.
- Figs. 231, 232, and 235. SPOONS. Of wood; painted. Cat. Nos. 16252-55, U. S. N. M. Tsimshian Indians, British Columbia. Collected by Dr. W. H. Dall.
- Figs. 226, 227, 228, and 234. SPOONS. Of wood; plain. Cat. Nos. 60145, 60153, and 1147, U. S. N. M. Kootznahoo Indians, Alaska. Collected by John J. McLean and James G. Swan.
- Fig. 233. OIL LADLE. Wood. Design, a raven. Cat. No. 60161, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.
- Fig. 237. SPOON OR LADLE. Wood. Cat. No. 74309, U. S. N. M. Tlingit, Alaska. Collected by John J. McLean.
- Fig. 238. SPOON. Wood; plain. Cat. No. 700, U. S. N. M. Northwest coast. Collected by George Gibbs.
- Fig. 239. SPOON. Carved wood, inlaid with haliotis shell. Cat. No. 33393, U. S. N. M. Tlingit Indians, Alaska. Collected by James G. Swan.



WOODEN SPOONS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XLIII.

HOUSEHOLD BOX ; ALSO USED AS A DEPOSITORY FOR THE CREMATED ASHES OF THE DEAD.

Fig. 242. CEDAR BOX. Totemic design, Hoorts, the bear. The lid is made of a slab of wood beveled on the under side to fit over the box. The sides are made of two pieces, one being the end and the other a single piece bent twice at right angles to form the two sides and the other end. There is very little appearance of breaking at the two corners. The joints at the other two corners are pegged together. The bottom is made of a separate piece of wood, so that altogether there are four pieces used in the construction of the box. This type, besides being used for various household purposes, is also the kind used amongst the Tlingit as a depository of the ashes of the dead. Cat. No. 74755, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.

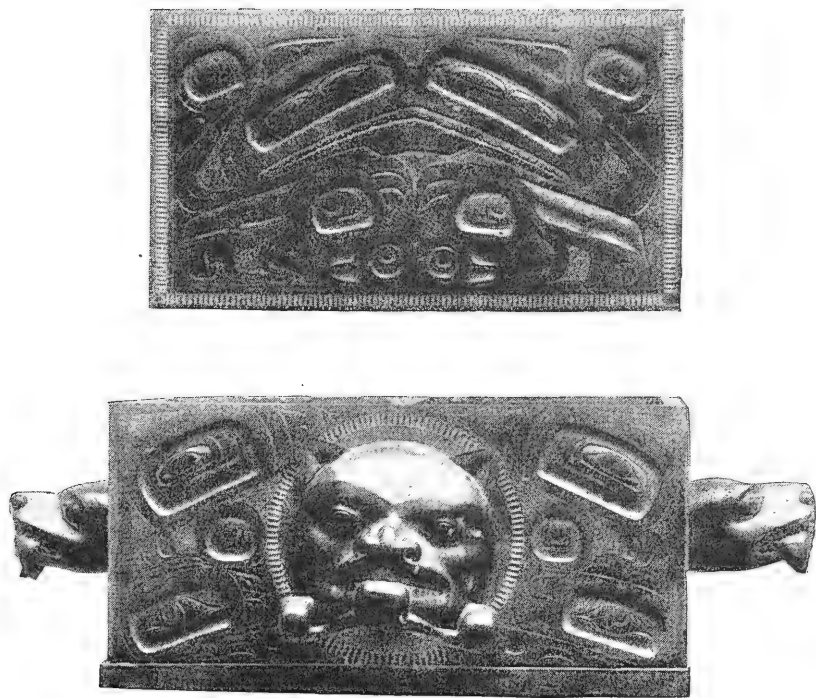


HOUSEHOLD BOX ; ALSO USED AS A DEPOSITORY FOR THE CREMATED ASHES OF THE DEAD.

EXPLANATION OF PLATE XLIV.

HAIDA CARVED BOX OF BLACK SLATE, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

Fig. 243. CARVED BOX. Of black slate. On the lid, a top view of which is shown above the box, two figures or faces may be seen. The upper one with the rows of teeth and protruding tongue is Hoorts, the bear. The two small oblong figures, one in each upper corner, represent the ears of the bear; the lower figure on the lid the face and flippers of Kye, the sea-lion; also seen in the handles on each side of the box. In the latter the sea-lion has in his mouth the salmon. The face on the side of the box is that of Hoorts, the bear, having in his mouth the hunter. This legend is explained in Chap. VII. The oblong figures in each corner are the paws of the bear. It should be mentioned here that in the Haida drawings an eye is placed in the breast, in the ear, paw, tail, etc., of figures, presumably on the belief that each member of the body has the power of looking out for itself or controlling its own movements. Cat. No. 89000, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



HAIDA CARVED BOX OF BLACK SLATE, FROM QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.



a similar piece forming the opposite side and end, and the joints secured by pegs or dowels. Where four pieces are used the corners are secured either by dove-tailing or by pegging. The bottom is made in a separate piece and pegged to the sides and ends. The top is slightly arched at the crown and bevelled on the under side to fit over the chest. Sometimes the top is flat and as thin as the sides, the edges having a broad strip running around them to fit over the box. Another type of household box is about 18 inches square by 24 inches high, as shown in Fig. 272, Plate LI, which also shows the method of cording. The top and bottom are made in somewhat similar shape of separate pieces. The sides are of a single wide thin piece of cedar, which is scarfed and deftly bent three times at right angles by steaming and hammering, with very little appearance of breaking at the bends, and pegged at the fourth corner, making a neat and tight joint. These boxes and chests are either carved or painted, or both, in totemic design, and are very elaborate and ornamental. A smaller and more handy type of wooden box is shown in Plate XLIII, which has a use, at times, other than that as a household utensil, viz, in receiving the cremated ashes of the dead. Its use as a funeral box is shown in Plates LXIV and LXV, Figs. 340, 343, and 348. A beautifully carved and polished Haida black slate box is represented in Plate XLIV. It is purely a work of art, and as such is a splendid illustration of the skill of these Indians in stone carving. The joints are made with wooden dowels and further secured with fish glue.

Cradles.—These are now rarely found, the child being carried slung in a shawl or blanket over the back in the usual Indian fashion. Dixon (1787) describes the primitive cradle which he saw amongst the Haida and Tlingit as follows:

Three pieces of bark are fastened together so as to form a kind of chair; the infant, after being wrapped in fur, is put into this chair and lashed so close that it can not alter its posture even with struggling, and the chair is so contrived that when a mother wants to feed her child, or give it the breast, there is no occasion to release it from its shackles. Soft moss is used by the Indian nurse to keep the child clean.*

Lisiansky mentions the wife of a chief coming on board his ship (1805) carrying her child in a basket. At the present day a canvas or blanket hammock is sometimes used, in camp or indoors, to rock the baby to sleep.

Paints.—As previously mentioned, the different kinds of paints used by the Indians in this region are charcoal, roasted and burnt fungus, white, red, and brown ochres, lignite, cinnabar, berry juice, spruce sap, and various other kinds of vegetable compounds. For tattooing and painting the face and body black, charcoal and lignite are used. Oil is mixed with all paints used on the body. Where lignite is used on wood, or for other purposes of a permanent nature, it is ground dry with salmon eggs, first chewed with cedar bark. This gives consistency to the paint

* Dixon, Voyage, p. 239.

and makes it stick well. A fungoid growth from the hemlock tree by various treatment becomes yellow, red, or black. When decayed to a powdery consistency, it is yellow; when roasted, it is red; and when charred, black. The Chilkat get the brilliant yellow for their blankets from a kind of moss called *sekhone*. Paint-brushes have been described in Chap. v, and are illustrated in Plate XLV. The stone mortars and pestles for grinding paint are similar to those shown in Figs. 337 and 339, Plate LXIII, for preparing native tobacco.

Metal working.—The tools with which the Indian artisan works out the surprisingly well-finished metal ornaments and implements of this region are simple and few in number. For bracelet making the silver-smith has a hammer, several cold chisels, and an etching tool which is merely a sharpened steel point or edge. Improvised iron anvils replace the stone implements of this kind doubtlessly used in former days. The details of bracelet making are given in Chapter IV. Copper is beaten into the required shapes. Steel tools now used are very deftly tempered and sharpened by the native artisan, who retains the primitive form of his implement or tool, and merely substitutes the steel for the former stone blade or head. The ingenuity which the Indians show in adapting iron and steel to their own uses is but one of the many evidences of their cleverness and intelligence.

Lumber and wood-work.—Incidental to the description of tools, houses, canoes, etc., allusions have been made to the expertness of the Indians in getting out lumber in the rough from the forests. The tools employed in wood-work have been described, but it is a never failing source of wonder to Europeans that they can accomplish so much with so little. Portlock (1787) observes:

It is very surprising to see how well they [Tlingit] will shape their boards with the shocking tools they employ; some of them being full 10 feet long, 2½ feet broad, and not more than an inch thick.*

It is, however, still more surprising to see the exquisite finish wrought on the rattles, head-dresses, masks, etc., in the relief carving for which these Indians of the north are famous.

PAINTINGS, DRAWINGS, AND CARVINGS.

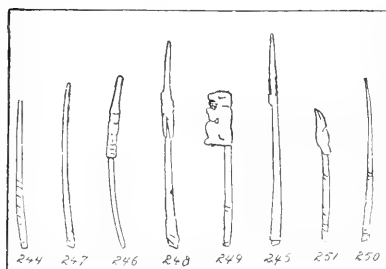
The pictographic art of these Indians is illustrated in nearly all the accompanying plates. A few details need to be added to explain the significance and trace the origin of the designs so lavishly bestowed upon nearly every article of personal and household property. The early voyagers were much struck by the artistic abilities of these people, and Dixon (1787) voices this feeling when he says of the Tlingit and Haida:

Many of these carvings are well proportioned and executed with a considerable degree of ingenuity, which appears rather extraordinary amongst a people so remote from civilized refinement.†

* Portlock, Voyage, p. 292.

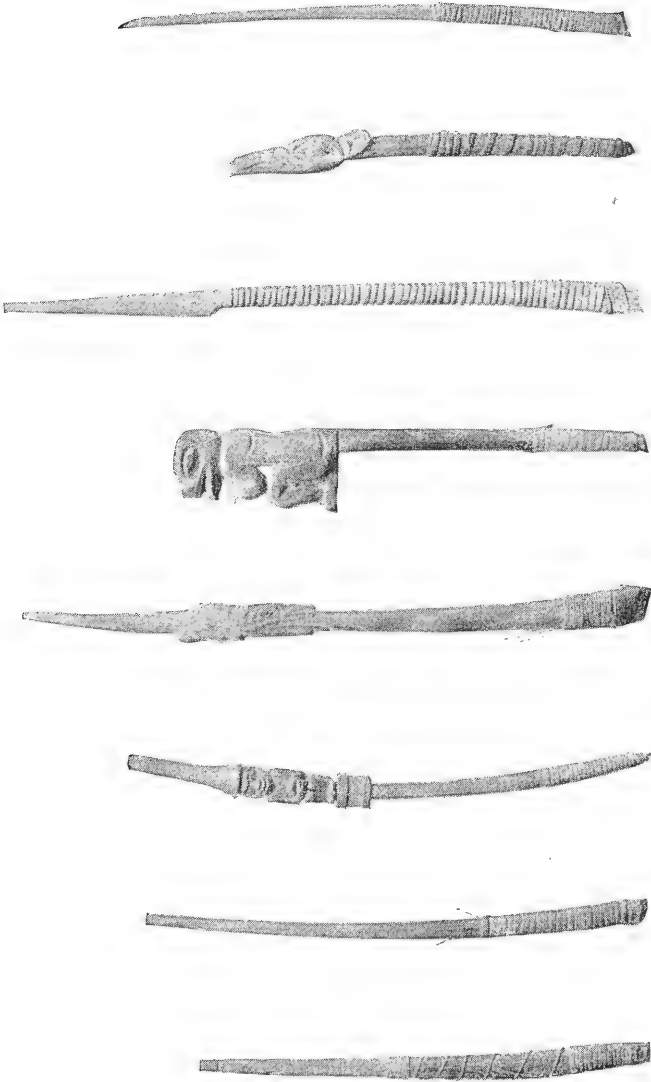
† Dixon, Voyage, p. 243.

EXPLANATION OF PLATE XLV A.



PAINT BRUSHES FROM THE NORTHWEST COAST.

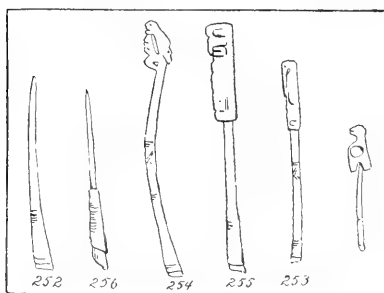
- Fig. 244. Presents a device for renewing the bristle when worn down.
- Fig. 246. From Sitka (Koloshan or Tlingit stock). Represents a chief with tall ceremonial hat.
- Fig. 248. From Masset, Queen Charlotte Islands, British Columbia (Haidan stock). Represents a land otter.
- Fig. 249. Represents a wolf.
- Fig. 251. The handle is split, the bristles being nipped in between the two parts. Represents a raven. Cat. No. 20548, U. S. N. M. Collected by James G. Swan. All the handles are made of wood. The brushes are of bristle or vegetable fiber. The same general type is found along the entire coast.



PAINт BRUSHES FROM THE NORTHWEST COAST.



EXPLANATION OF PLATE XLV, B.



PAINT BRUSHES FROM THE NORTHWEST COAST.

Fig. 253. Represents a raven.

Fig. 254. Bone handle. Represents Oolalla, the mountain demon.

Fig. 255. Represents an eagle.

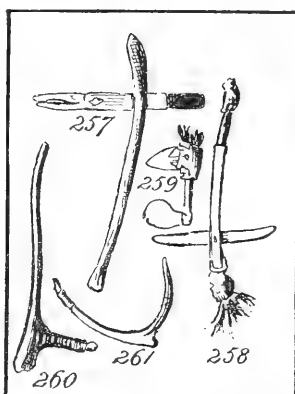
Fig. 256. From the Bella Bella tribe of the Kwakiutl (Haeltzukan stock). Cat. No. 20548. U. S. N. M. Collected by James G. Swan.

All the handles, except of Fig. 254, are made of wood. The brushes are either of bristle or vegetable fiber. The same general type of brush is found along the entire coast.



PAINT BRUSHES FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE XLVI.



SLAVE-KILLERS FROM THE NORTHWEST COAST; FORMERLY USED IN DISPATCHING SLAVES.

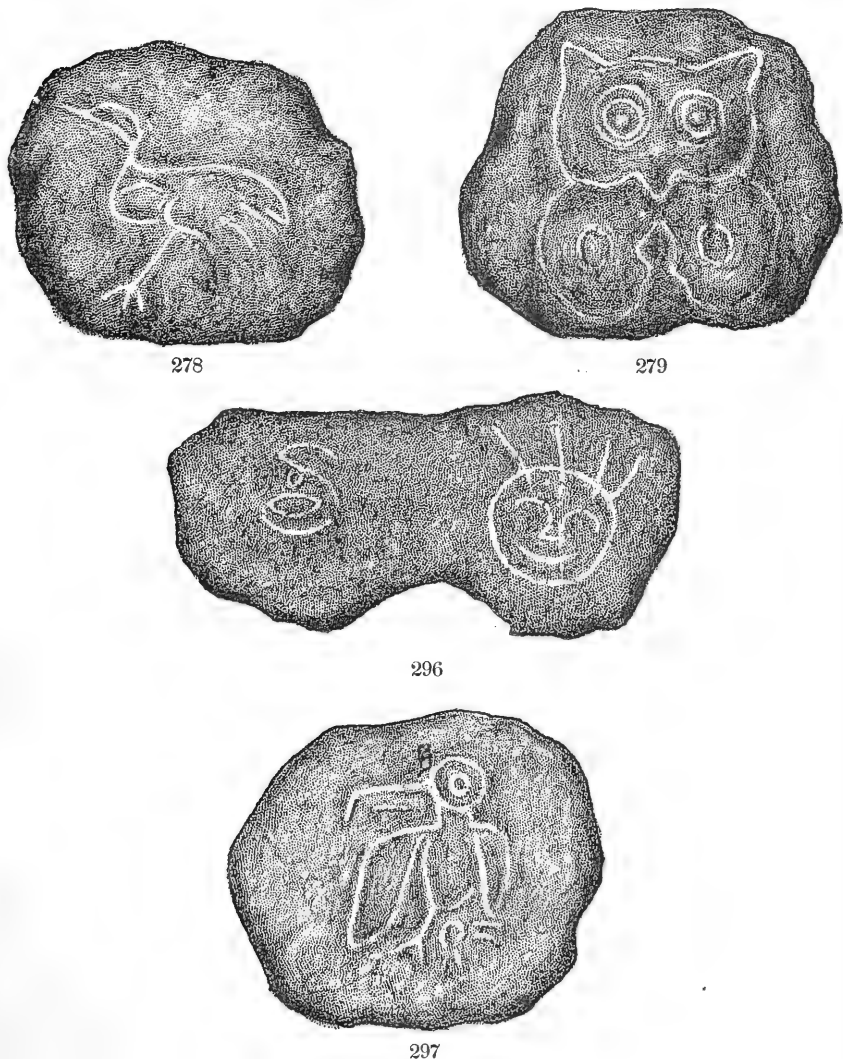
- Fig. 257. Made of bone. Carved to represent the beak of a raven. Cat. No. 127173, U. S. N. M. Tlingit Indians, Alaska. Collected by E. B. Webster, U. S. Navy.
- Fig. 258. Of wood; ornamented with a carved head and human hair. Cat. No. 73831, U. S. N. M. Tlingit Indians, Alaska. Collected by Lieut. T. Dix Bolles, U. S. Navy.
- Fig. 259. (Seisher or Sitzee, Haida). Wooden head; steel point. Ornamented with human hair. Cat. No. 74763, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 260. Made from Elk antler, carved in totemic design, and armed with a sharp stone point. Cat. No. 74500, U. S. N. M. Tlingit Indians, Alaska. Collected by James G. Swan.
- Fig. 261. (Sitzee). Made from a deer antler, and carved to represent the head of Tl'koh, the crane; the handle represents a bear's paw. Cat. No. 88701, U. S. N. M. Kaigani village of Howkan, Alaska. Collected by James G. Swan.



SLAVE-KILLERS FROM THE NORTHWEST COAST ; FORMERLY USED IN DISPATCHING SLAVES.



The rudest form in which this art embodies itself is in the pictographs on the rocks. These are found just above high-water mark around the sites of ancient and abandoned villages. Two groups of them, from the ancient village of Stikine, near Ft. Wrangell, Alaska, are shown in Plate XX, and in Figs. 278, 279, 296, and 297. These have



Figs. 278, 279, 296, 297.

CARVINGS ON ROCKS. SITKA, ALASKA.

(From sketches by the author.)

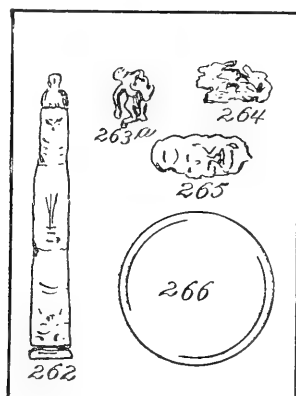
no other significance than the practice in idle hours of an art in which they were all striving to attain excellence. Some, outstripping others, became in time famous carvers, decorators, or tattooers, their fame even extending beyond their own village or tribe. In one sense these carv-

ings on the rocks are in the nature of drawings, as they appear also in painted figures on the simpler objects, but in the paintings on wood the patterns are very much more elaborate than those simple etchings on the rocks, as shown, for instance, in the carved and painted figures on the chest and box in Plate LI. In their paintings the favorite colors used are black, light green, and dark red. Whether produced in painting, tattooing, or relief-carving the designs are somewhat conventional. However rude the outline, there are for some animals certain conventional signs that clearly indicate to the initiated what figure is meant. With the brown bear it is the protruding tongue; with the beaver and wolf it is the character of the teeth; with the orca, the fin; with the raven, the sharp beak; with the eagle the curved beak, etc. Certain groupings or figures are also generally recognized as portraying certain well-known legends, such, for instance, as the "bear and the hunter" (Plates XXXV, XLI, and XLIV); the "raven and the moon" (Plate XXXV), etc., which will be explained hereafter. In the interweaving of colors to form a totemic pattern or design, as in the Chilkat blankets, the Indians attained the greatest perfection in their art up to their contact with the whites. Since then the carvings of the Haida in black slate may be said to show the height which their art has now attained.

Drawings and paintings.—In plate XX, and in Figs. 278, 279, 296, and 297, the crude sculpturing on the rocks near Fort Wrangell are shown. In Plates IV and V various tattooing devices are illustrated. Indeed, in nearly every plate some form of totemic pictograph is represented, and it only remains to explain the significance of some of the figures. Plate LII is reproduced from illustrations in the "West Shore," August, 1884, accompanying an article by Judge J. G. Swan, of Port Townsend, Washington Territory. The drawings were made by Johnnie Kit-Elsua, the young Haida interpreter, who accompanied Judge Swan on a trip to the Queen Charlotte Islands, in 1883. It may not be out of place here to say that, in the estimation of the writer, there is no more competent authority on the ethnology of the northwest coast than Judge Swan, and he is particularly well informed in the matter of coast Indian mythology and folklore, a branch of which subject the writer can only touch on in this connection. It is to be hoped, however, that a systematic Governmental investigation will be undertaken in the next few years, for it will soon be too late to gather the materials needed. Fig. 280, Plate LI, represents the orca, or whale-killer, which the Haida believe to be a demon called *Skana*. Judge Swan says that, according to the Indian belief:

He can change into any desired form, and many are the legends about him. One which was related to me was that ages ago the Indians were out seal-hunting. The weather was calm and the sea smooth. One of these killers, or black-fish, a species of porpoise, kept alongside of a canoe, and the young men amused themselves by throwing stones from the canoe ballast and hitting the fin of the killer. After some pretty hard blows from these rocks the creature made for the shore, where it grounded on the beach. Soon a smoke was seen, and their curiosity prompted them

EXPLANATION OF PLATE XLVII.



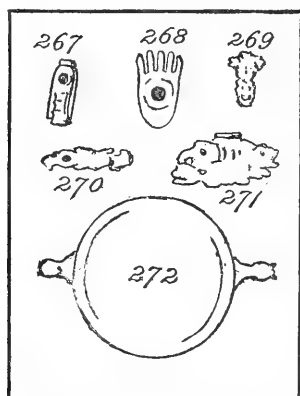
SLATE CARVINGS FROM THE QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

- Fig. 262. MODEL OF TOTEM POST. Slate. Top figure, the eagle; next, the orca or killer; next, the raven; the lowest, the beaver. Cat. No. 88977, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 263a. FIGURE IN BLACK SLATE. "The bear mother." This figure is reproduced in Plates XLIX and L. For legend see text. This may be taken as the best specimen of Haida slate-carving. Made by Skaows-ke'ay, an Indian carver of Skidegate, Queen Charlotte Islands, British Columbia. Cat. No. 73117, U. S. N. M. Collected by James G. Swan.
- Fig. 264. SLATE PIPE. Cat. No. 2589, U. S. N. M. Northwest coast. Collected by Capt. Charles Wilkes, U. S. Navy.
- Fig. 265. SLATE PIPE. Cat. No. 2590, U. S. N. M. Puget Sound, Washington. Collected by the U. S. Exploring Expedition, Capt. Charles Wilkes, commander.
- Fig. 266. SLATE DISH. Design, the orca or killer. Cat. No. 89005, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



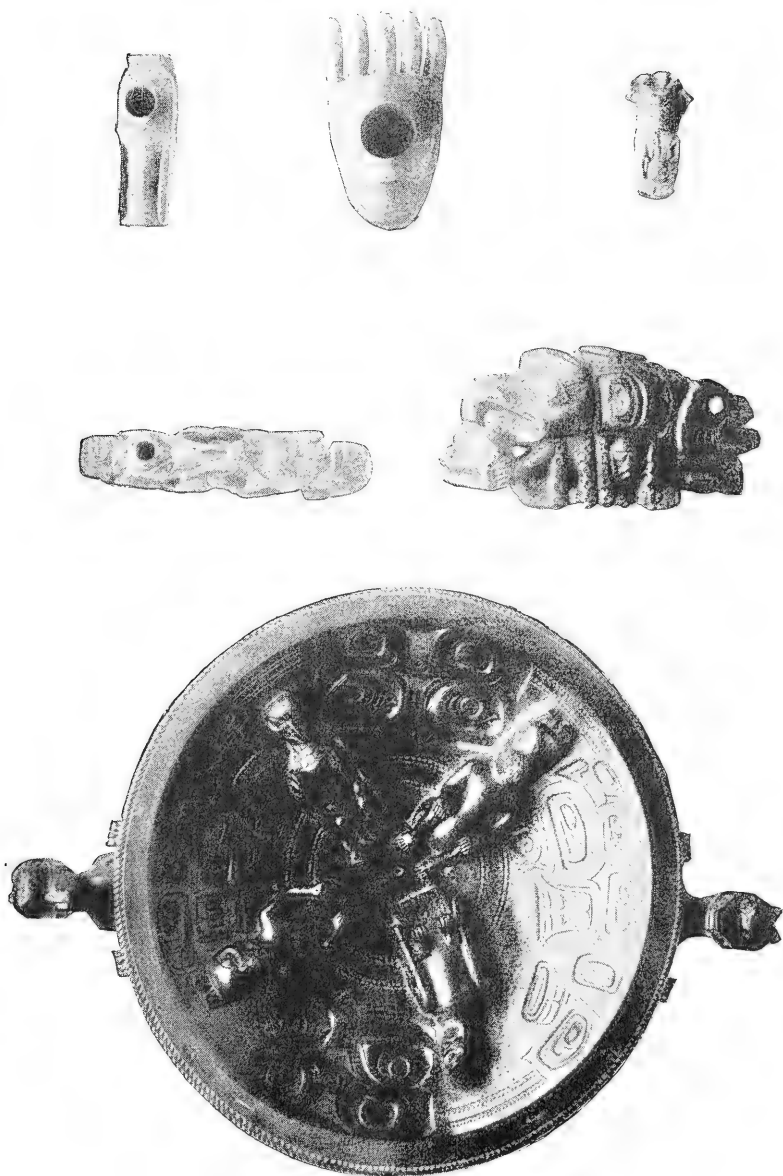
SLATE CARVINGS FROM THE QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA.

EXPLANATION OF PLATE XLVIII.



PIPES FROM THE NORTHWEST COAST. HAIDA SLATE DISH.

- Fig. 267. TOBACCO PIPE. Of wood; carved in shape of dragon fly. Bowl, a cylinder of copper. Cat. No. 72426, U. S. N. M. Tlingit, Sitka. Collected by John J. McLean.
- Fig. 268. TOBACCO PIPE. Of wood; in shape of bear's paw. Cat. No. 9270, U. S. N. M. Tlingit, Sitka. Collected by Dr. A. H. Hoff, U. S. Army.
- Fig. 269. TOBACCO PIPE. Of antler; in shape of Indian doctor. Cat. No. 67882, U. S. N. M. Tlingit, Sitka. Collected by John J. McLean.
- Fig. 270. TOBACCO PIPE. Of slate. Compare Fig. 265. Cat. No. 2590, U. S. N. M. Puget Sound, Washington. Collected by Capt. Charles Wilkes, U. S. Navy.
- Fig. 271. TOBACCO PIPE. Carved in wood and inlaid with abalone. Cat. No. 6014, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by Colonel Bulkely, U. S. Army.
- Fig. 272. SLATE DISH. Around the center are carved two eagles and two wolves. Handles represent sea-lions. Cat. No. 89004, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



PIPES FROM THE NORTHWEST COAST. HAIDA SLATE DISH.

EXPLANATION OF PLATE XLIX.

HAIDA SLATE-CARVING, REPRESENTING THE "BEAR-MOTHER."

Fig. 263*b*. This specimen is also shown in Plates XLVII and L. The legend is given in Chapter V, under the subject of bears. The Haida version of it is as follows:

A number of Indian squaws were in the woods gathering berries when one of them, the daughter of a chief, spoke in terms of ridicule of the whole bear species. The bears descended on them and killed all but the chief's daughter, whom the king of the bears took to wife. She bore him a child half human and half bear. The carving represents the agony of the mother in suckling this rough and uncouth offspring. One day a party of Indian bear hunters discovered her up a tree and were about to kill her, thinking her a bear, but she made them understand that she was human. They took her home and she afterwards became the progenitor of all Indians belonging to the bear totem. They believe that bears are men transformed for the time being. This carving was made by Skaows-ke'ay, a Haida. Cat. No. 73117, U. S. N. M. Skidegate village, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



HAIDA SLATE-CARVING, REPRESENTING THE "BEAR-MOTHER."

EXPLANATION OF PLATE L.

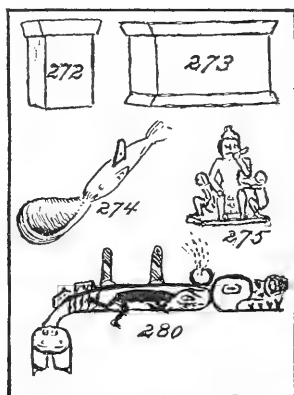
HAIDA SLATE-CARVING, REPRESENTING THE "BEAR-MOTHER."

Fig. 263*c*. This specimen is also illustrated in Plates XLVII and XLIX, and fully described in the legend accompanying the latter plate. Carved by Skaows-ke'ay, a Haida. Cat. No. 73117, U. S. N. M. Skidegate village, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



HAIDA SLATE-CARVING REPRESENTING THE "BEAR-MOTHER."

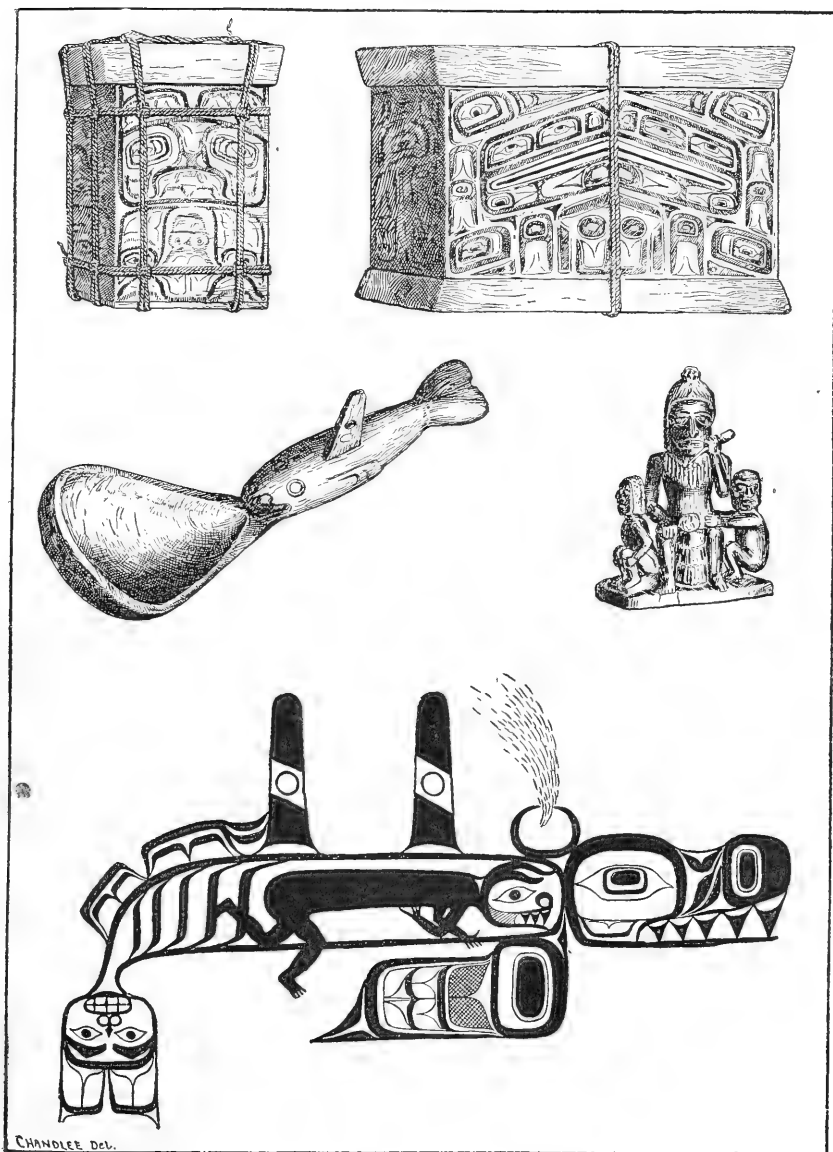
EXPLANATION OF PLATE LI.



CHESTS, CARVINGS, ETC., FROM THE NORTHWEST COAST.

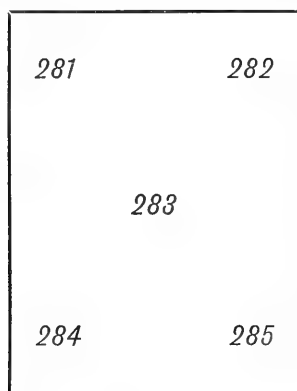
From photographs and sketches by the author.

- Fig. 272. **HOUSEHOLD BOX OR CHEST.** With sides made from a single wide, thin piece of cedar scarfed and bent three times and pegged at the fourth corner. The specimen is about 18 inches square by 24 inches high. The method of cording is also shown. The totemic design is the bear. Haida Indians, Queen Charlotte Islands, British Columbia.
- Fig. 273. **HOUSEHOLD CHEST.** With sides made from two pieces of wide, thin cedar wood; bent at right angles and pegged together at diagonally opposite corners. The bottom and top are made of oblong slabs of wood neatly dressed down, the bottom being pegged to the sides and ends.
- Fig. 274. **CEREMONIAL SPOON.** Of wood, with handle carved to represent the orca holding the bowl in his mouth. This is used in the ceremonies attending a Haida youth's attainment of majority, when he is required to drink down the contents of the spoon, consisting of about two quarts of fish-oil.
- Fig. 275. **CARVED SLATE FIGURE.** Commemorating a legend relating the prowess of a certain Indian shaman, who is said to have raised two Indians from the dead at Skidegate, Queen Charlotte Islands.
- Fig. 280. **HAIDA PICTOGRAPH.** Representing Skana, the orca or whale-killer. (See Chapter VII.) From a photograph of a drawing in the possession of James G. Swan.



CHESTS, CARVINGS, ETC., FROM THE NORTHWEST COAST.

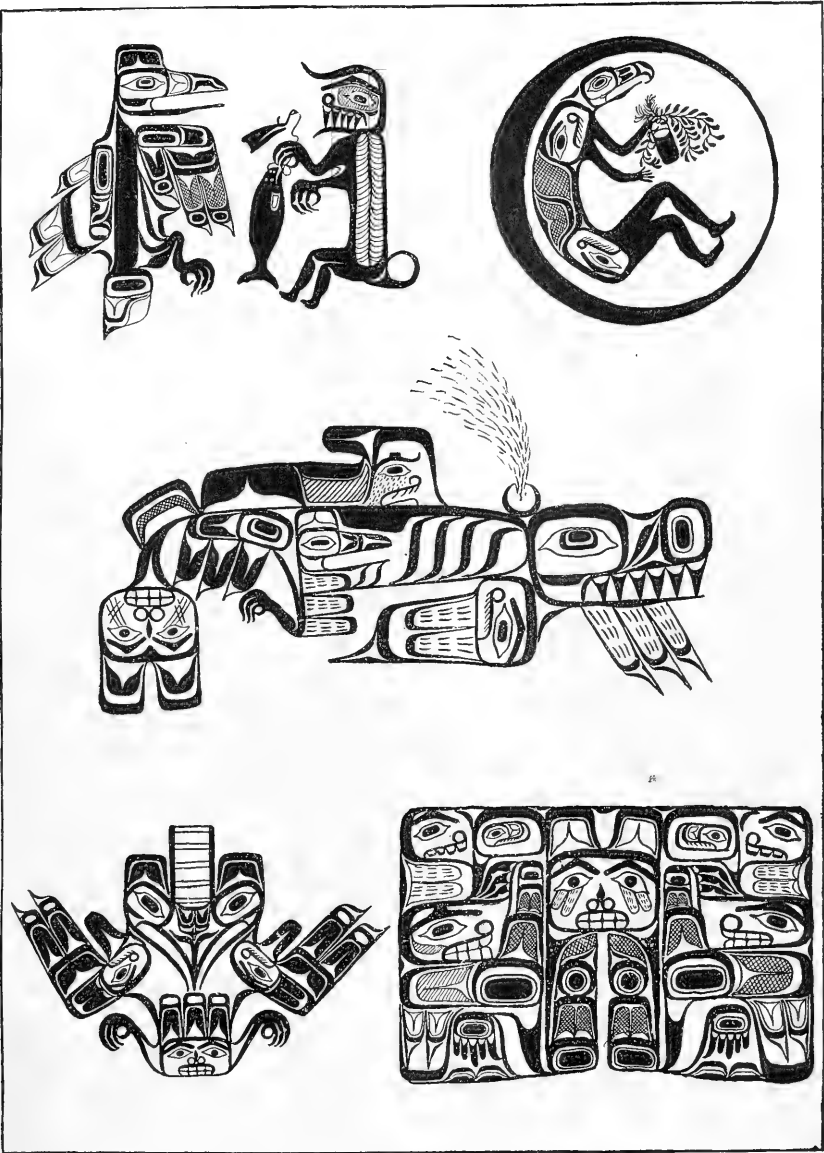
EXPLANATION OF PLATE LII.



HAIDA LEGENDARY DRAWINGS OR PICTOGRAPHS.

From illustrations in the West Shore (August, 1884), made by Johnnie Kit-Elsua, a Haida Indian.

- Fig. 281. Represents the legend of the raven and the fisherman as related in Chapter VII, page 323.
- Fig. 282. Represents Koong, the moon, and Ecthlinga, the man, and relates to the story of how the man came in the moon. The legend, as related on page 323, seems also to refer to the difference recognized by some between a wet and a dry moon.
- Fig. 283. Represents the raven (Hooyeh) in the belly of the whale (Koone). (See page 323.)
- Fig. 284. Represents Hooyeh, the mischievous raven that possesses the power of changing itself into countless forms, and which has, from the creation of the world, been the benefactor and helper of mankind. (Page 324.)
- Fig. 285. Represents T'kul, the wind spirit, and the cirrus clouds, explaining the Indian belief in the causes of the changes in the weather. (See page 324.)



HAIDA LEGENDARY DRAWINGS OR PICTOGRAPHS.

to ascertain the cause, but when they reached the shore they discovered, to their surprise, that it was a large canoe, and not the *Skana* that was on the beach, and that a man was on shore cooking some food. He asked them why they threw stones at his canoe. "You have broken it," said he, "and now go into the woods and get some cedar withes and mend it." They did so, and when they had finished the man said, "Turn your backs to the water and cover your heads with your skin blankets, and don't you look till I call you." They did so, and heard the canoe grate on the beach as it was hauled down into the surf. Then the man said, "Look, now." They looked, and saw the canoe just going over the first breaker and the man sitting in the stern; but when it came to the second breaker it went under and presently came up outside of the breakers a killer and not a canoe, and the man or demon was in its belly. This allegory is common among all the tribes on the northwest coast, and even with the interior tribes with whom the salmon takes the place of the orca, which never ascends the fresh-water rivers. The Chilkat and other tribes of Alaska carve figures of salmon, inside of which is the full length figure of a nude Indian. * * * Casual observers, without inquiry, will at once pronounce it to be Jonah in the fish's belly, but the allegory is of ancient origin, far antedating the advent of the white man or the teachings of the missionary."

Fig. 281 represents the raven and the fisherman. The same authority says:

Hooyeh, the raven, had the mischievous propensity of descending into the ocean and investigating the fishing-lines of *Houskana*, the fisherman, and stealing both bait and fish. At last *Houskana*, tired of this work, put on a magic hook to ascertain who his enemy was at the bottom of the sea. The raven was caught, and when the fisherman hauled in his line the raven resisted by pressing his feet and wings against the bottom of the fisherman's canoe. But *Houskana* was the stronger and pulled the raven's beak entirely off, and, seizing the raven, took him ashore to find out who he was, for, as soon as his beak was pulled off he changed to a man, covering his head with his skin mantle so that nothing but his eyes could be seen. The fisherman tried in vain to make him uncover his face. At last one of the young men took a handful of filth and rubbed it in the raven's eyes. This made him throw off his mantle, and then they saw that it was the *Hooyeh*. This made the raven so angry that, in revenge for this indignity, the raven and his friends, the crows (*Kaltzda*), have ever since annoyed the Indians by soiling their canoes and eating all their fish."

Fig. 282 represents the "Man in the Moon." According to Judge Swan:

Koong, the moon, discovered *Eethlinga*, the man, about to dip his bucket in the brook for water, so it sent down its arms or rays and grabbed the man, who, to save himself, seized hold of a big solal bush (*Gaultheria shallon*), but the moon being more powerful took man, bucket, and bush up to itself, where they have ever since lived and can be seen every full moon when the weather is clear. The man is a friend of *T'kul*, the spirit of the winds, and at the proper signal empties his bucket, causing rain upon the earth.

Fig. 283 represents the raven (*Hooyeh*) in the belly of the whale (*Koone*). Judge Swan explains it as follows:

The Haidahs are not whalers, like the Makahs of Cape Flattery, and I never knew of their killing a whale; but occasionally a dead one drifts ashore, having been killed by whalers, or sword-fish, or orcas (killers). The Haidahs do not care to look for natural causes, but adopt the mythological dogma that the raven goes into the whale's belly, which, frantic with pain, rushes ashore, while the invisible *Hooyeh* walks quietly out and is ready for another adventure.

Fig. 284 represents *Hooyeh*, the mischievous raven that possesses the power of changing itself into countless forms, and which has, from the creation of the world, been the benefactor of mankind, but which likewise delights in playing pranks. Endless legends are told of his adventures.

Fig. 285 represents cirrus clouds:

The center figure is *T'kul*, the wind spirit. On the right and left are his feet, which are indicated by long streaming clouds; above are the wings, and on each side are the different winds, each designated by an eye, and represented by the patches of cirrus clouds. When *T'kul* determines which wind is to blow, he gives the word and the other winds retire. The change in the weather is usually followed by rain, which is indicated by the tears which stream from the eyes of *T'kul*.

These legends illustrate how pregnant with meaning is every carving and pictograph of this prolific people, and what work must be embodied in the task of tracing them out and comparing them with those of adjacent regions. No idea of the ethnical affinities of the various stocks can be formed without comparative mythological study, and the sooner the work is undertaken the better.

Carvings.—Fig. 286 is a carved wooden rattle, which is pictured in other positions in Figs. 287, 288, and 290, Plate LIV. According to Judge Swan, the carving on the breast of the bird represents the sparrow-hawk, the bird itself representing *Hooyeh*, the raven. The tail of the raven is carved to represent a bird's head, carrying in its beak a frog. The frog is supposed to possess a subtle poison in its head, which, when sucked out, enables a medicine man to work bad spells. The figure on the back is *Oolalla*, or *Ka-ka-hete*, the whistling demon, who lived in the mountains and was once traveling in his canoe when he was capsized and nearly drowned. He swam ashore and ran into the woods for shelter. He occasionally descended to the villages and stole the children, which he took into the woods and ate. *Ka-ka-hete* afterwards turned into a land-otter. This type of rattle is found quite generally among all the northern tribes, and is carried by the chiefs in the ceremonial dances. (See Plate IX.) The carved columns in front of the houses may be divided into two classes, totemic and commemorative.

Totemic columns.—These are the very tall ones erected in front of the houses, and are generally surmounted by the clan-totem of the chief occupant. Those below may represent the totem of his wife (and hence of his children), or illustrate some legend intimately connected with or referring to the totem of the owner. Some columns are purely legendary, but refer to the totem of the owner, and are in this sense totemic. Amongst the Tlingit the phratry totem often surmounts the column with the clan and other totems represented below it. None but the wealthy can afford to erect these carved columns, and the owner of one is thereby invested with so much the more respect and authority that he becomes, as the head of the household, a petty chief in the village. As heretofore and hereafter described, the ambition of a life centers in

EXPLANATION OF PLATE LIII.

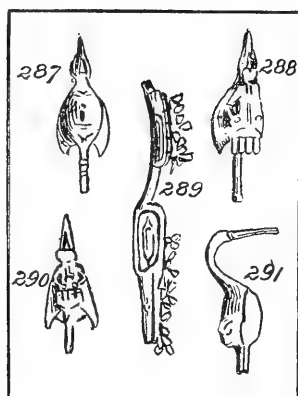
CARVED WOODEN CEREMONIAL RATTLE FROM THE NORTHWEST COAST.

Fig. 286. RATTLE. This is a side view of the rattle shown in back view in Fig. 287, Plate LIV, and top view in Fig. 288. This rattle is supposed to possess magical power in that it depicts a legend of Ka-Ka-Tete, the whistling demon, as described in Chapter VII, under the head of Carvings. This is a very common type of rattle, and is found throughout the coast. Cat. No. 89085, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



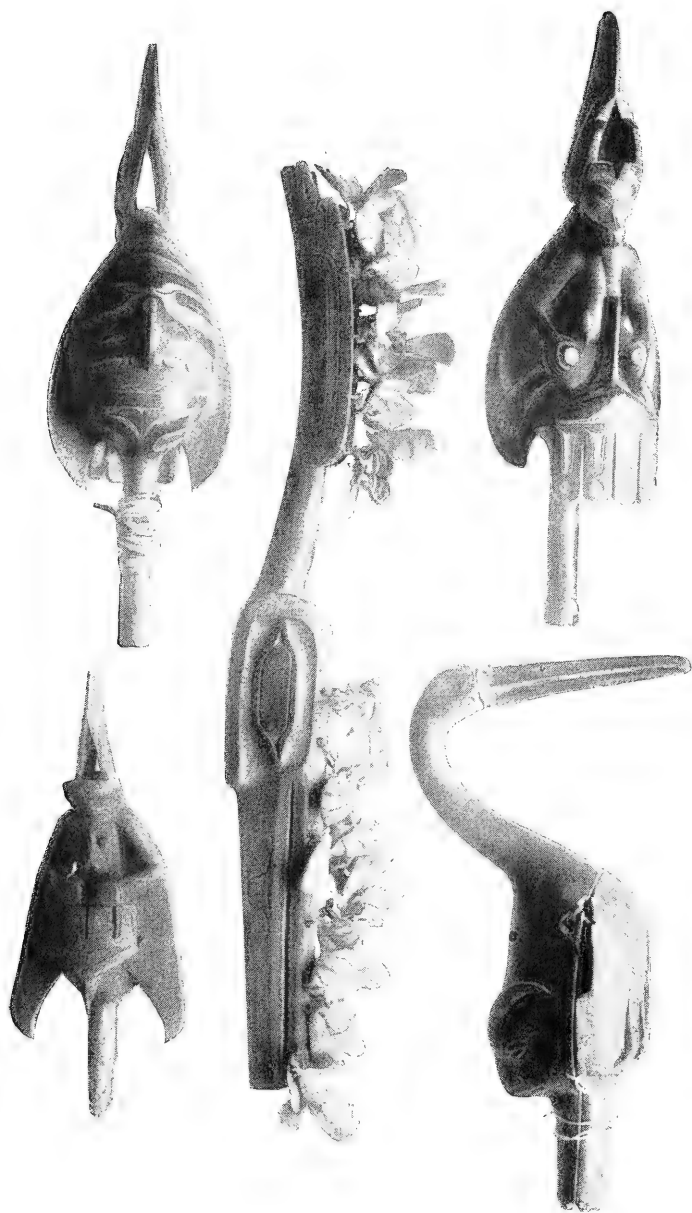
CARVED WOODEN CEREMONIAL RATTLE FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE LIV.



CEREMONIAL RATTLES FROM THE NORTHWEST COAST.

- Fig. 287. RATTLE. Of wood; carved. Shown in top view in Fig. 286. Legend in Chapter VII. Common type. Cat. No. 89085, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 288. RATTLE. Top view of same kind of rattle as Fig. 287. Cat. No. 89078, U. S. N. M. Haida Indians, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 289. RATTLE. Of carved wood. Design, a duck, with ornaments of beaks of the puffin. Cat. No. 20828, U. S. N. M. Klowak Indians (Hanega tribe), Prince of Wales Island, Alaska. Collected by James G. Swan.
- Fig. 290. RATTLE. Top section of usual type of rattle. See Figs. 287, 288. Cat. No. 10309, U. S. N. M. Tongass village, Alaska (Tlingit Indians). Collected by Lieut. F. W. Ring, U. S. Army.
- Fig. 291. RATTLE. Of wood; ancient. Design, a crane with tail carved to represent the head of a mountain goat. Cat. No. 73798, U. S. N. M. Auk Indians, Alaska. Collected by Lieut. T. Dix Bolles, U. S. Navy.



CEREMONIAL RATTLES FROM THE NORTHWEST COAST.

the endeavor to accumulate enough property or wealth to enable a free-man to rise to this dignity of a petty chief. A great deal of mystery has been thrown around these pictographic carvings, due to the ignorance and misconception of some writers and the reticence or deliberate deception practiced by the Indians themselves. They are in no sense idols, but in general may be said to be ancestral columns. The legends which they illustrate are but the traditions, folk-lore, and nursery tales of a primitive people; and, while they are in some sense childish or frivolous and at times even coarse, they represent the current of human thought as truly as do the ancient inscriptions in Egypt and Babylonia, or the Maya inscriptions in Yucatan. The meaning of a few of these columns may, by inference, be taken to represent the general character of all.

In Plate XXXV, Fig. 179, is a carved column in front of the model of a Haida house. The surmounting figure represents *Hoots*,* the brown bear, which is the totem of the head of the household who erected it. At the bottom is *Tsing*, the beaver, the totem of the wife and children. Above it is the figure of the "bear and the hunter," already alluded to. According to Judge Swan, the hunter *Toivats* on one occasion visited the house of the King of the Bears, who was absent. His wife being at home, he made love to her. When the bear returned he found his wife in confusion and accused her of infidelity, but she denied it. She went regularly to get wood and water, and the bear, still suspicious, one day fastened a magic thread to her dress. On following it up he found her in the arms of the hunter, whom he forthwith killed, as in the pictograph. Whether or not this legend originated in the confusion arising from a failure to distinguish between one of the bear totems and a real bear, it is impossible to say, but for our purposes as a carving it illustrates three points: first, that as a legend it refers to the bear totem; second, that it warns wives to be faithful to their husbands; and third, it indicates a belief, on the part of these Indians, in the possibility of human relations with animals, which, as shown in Chapter III must of necessity precede a belief in totemism itself.

Above the "bear and hunter" is *Tetl*, the great raven, having in his beak the new moon and in his claws the dish containing fresh water, illustrating the common and familiar legend of the creation: *Tetl*, the benefactor of man, stole from his evil uncle Kaunk,† the enemy of man, the new moon, *Kung*, which he had imprisoned in a box, and also got fresh water by strategy from the daughter of Kaunk, to whom he made love, and, deceiving her, stole a dish of fresh water and flew with it out the smoke-hole of Kaunk's house. Above the raven are four disks

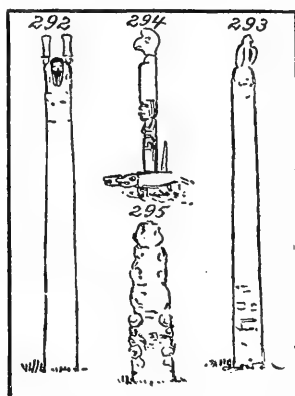
* In the Kaigani dialect the brown bear is *hoots*; wolf, *howootz*; hawk, *howot*, and hair seal, *howoot*. By inflection and aspiration these names are pronounced so differently as to leave no room for mistaking one for another. The black bear is *tan*, the same as in the Skidegate dialect of the Haida language.

† By some Kaunk is identified with the eagle in the creation legend (Boas) and by others with the wolf (Veniaminoff).

called *skil*. These appear also on the top of several ceremonial grass hats and wooden helmets and batons, illustrated in the accompanying plates. Their exact significance is uncertain, but the number of these *skil* disks is in general an index of the rank, wealth, and standing of the chief or owner. It is stated on some authorities and disputed on others, that each disk commemorates some meritorious act of the owner, such as the giving of a great potlatch, or the gaining of a victory over an enemy. In this sense it indicates the right of the owner to the enjoyment of the respect and esteem of the tribe. It is also stated that the holes pierced in the lobes of the ear and the disks worn on the ceremonial hat also correspond to this same number. The difference of opinion is doubtless due to the variation in the custom amongst different stocks. The form of carving may be borrowed without the significance being understood or remembered. The weight of evidence would seem to favor the belief that each disk or *skil* had the significance indicated, that is, of commemorating some deed of prowess of the possessor.

Plate LV., Fig. 292, represents another column which may be taken as a type. It is found at the Kaigani village of Kasa-an, Skowl Bay, Prince of Wales Island, Alaska. The top group represents the head of a European, with whitened face and long, black whiskers, flanked on either side by two figures representing children in sitting posture, wearing tall hats. These hats in Kaigani are called *Hat cachanda*, and each have four *skil*. The group represents the following legend, either commemorating an actual occurrence or else being a nursery tale originally invented to frighten refractory children, becoming in time, through repetition and misconception, a veritable tradition. Many years ago the wife of a chief went out in a small fishing canoe, with her two children, near the summer camp to get the pine boughs, on which salmon spawn is collected. She drew up her canoe on the beach, and warned the children not to wander off. On her return they had disappeared. She called to them, and they answered her from the woods with voices of crows. Always when she sought them, two crows mocked her from the trees. The children never returned, and it was said that the white traders had kidnapped them and carried them off in their ship. The face with the beard represents the trader, and the two figures the kidnapped children. The figure next to the top, with the instrument in his claws across his breast, represents the crane (*he ko*), and the legend, or rather an incident in a legend, is roughly as follows: The crane was formerly an expert with tools, but they were stolen from him by a mischievous character, (*T'skan-ahl*), and ever since he has been bewailing his fate. The cry which the crane now utters is, "I want my tools." The next figure below is *hoots*, the bear, holding between his paws the butterfly. At the creation, when the great *Tetl*, the benefactor of man, was looking for fair land for man to occupy, the butterfly hovered over his head as he flew. When he came to the country now occupied by the Haida, the butterfly pointed with his

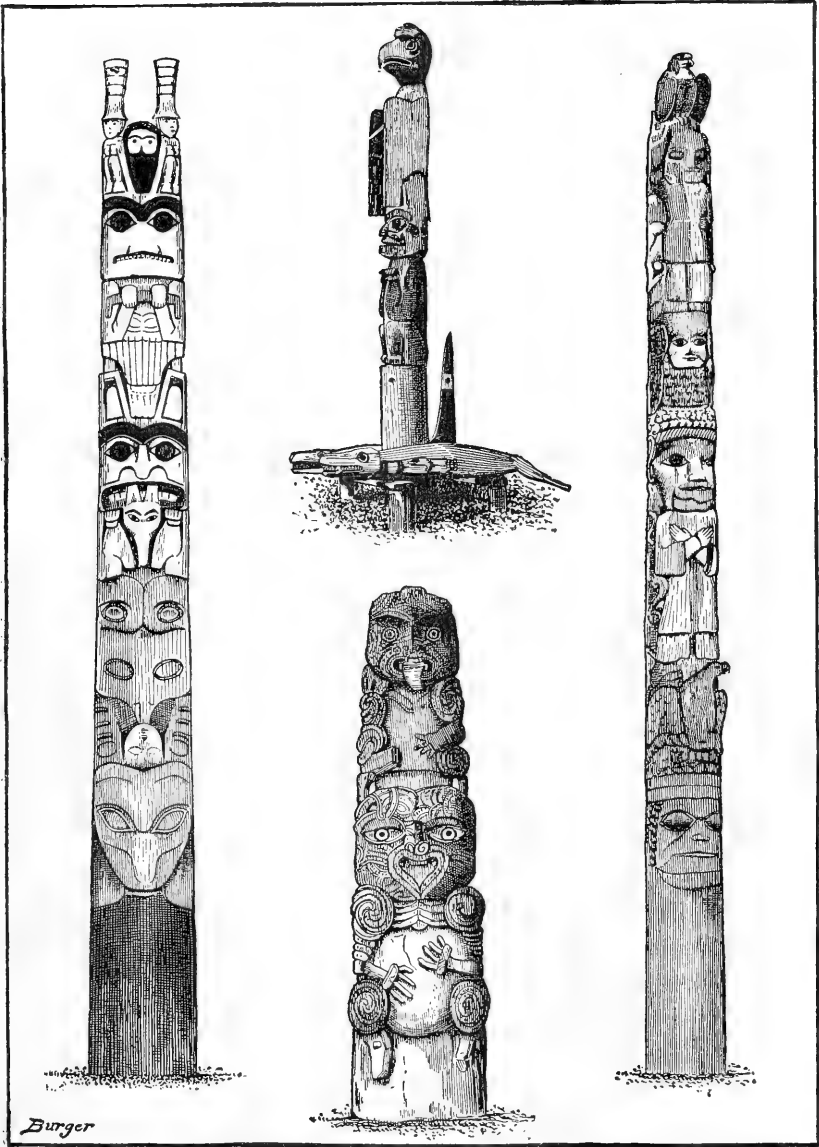
EXPLANATION OF PLATE LV.



CARVED COLUMNS FROM THE NORTHWEST COAST AND TIKI FROM NEW ZEALAND.

From photographs by the author.

- Fig. 292. CARVED COLUMN. At the Kaigani village of Kasa-an, Prince of Wales Island, Alaska. Described in detail in Chapter VII.
- Fig. 293. CARVED COMMEMORATIVE COLUMN. In front of the feast house of Chief Skowl, at Kasa-an village, Prince of Wales Island, Alaska.
- Fig. 294. CARVED MORTUARY OR COMMEMORATIVE COLUMN. In front of the house of Chief Kootenah, at Tongass village, Alaska (Tlingit).
- Fig. 295. TIKI. At Raroera Pah, New Zealand. Introduced here by way of contrast with the carvings of the Haida. From Wood's Natural History, page 180. Of this he says: "This gigantic tiki stands, together with several others, near the tomb of the daughter of Te Whero-Whero, and, like the monument which it seems to guard, is one of the finest examples of native carving to be found in New Zealand. The precise object of the tiki is uncertain, but the protruding tongue of the upper figure seems to show that it is one of the numerous defiant statues which abound in the islands. The natives say that the lower figure represents Maui the Atui who, according to Maori tradition, fished up the islands from the bottom of the sea."



CARVED COLUMNS FROM THE NORTHWEST COAST AND TIKI FROM NEW ZEALAND.



proboscis to the good lands, and said: "Where the bear is there are salmon, herbs, and good living;" so that accounts for how the Haida came to the Queen Charlotte Islands, and why bears are so abundant. This is similar to the story told Judge Swan by *Edniso* of Masset, British Columbia. The next figure is the giant spider sucking the blood and killing a man. One of the numerous adventures of *T'skan-ahl* was to kill the giant spider, which was such a mortal enemy to man. *T'skan-ahl* overcome the spider and threw him into the fire, but instead of burning he shriveled up and escaped as a mosquito, carrying away with him a small coal of fire in his proboscis. Now instead of killing men he can only suck a little blood, but in revenge he leaves a coal of fire in the bite. My informant, a Kaigani, stated that it would take three days to relate all the adventures of *T'skan-ahl*. The lowest figure is *Koone*, the whole representing the totem of the owner of the column.

The key to all the carvings is found in the legends of the Indians. Often their significance is lost; often individual eccentricity leads an Indian to make a carving of which he alone knows the meaning; often only the older Indians are well informed enough to tell off-hand what a carving means. These causes, combined with the indifference of the younger generation and the sensitiveness and reticence of the older, makes it extremely difficult to arrive at the significance of the figures. Often they concoct stories to mislead an inquirer, and laugh in their sleeve at the credulity shown. Until a general collection of the legends of the coast is made we must remain content with selecting a few types, as in the foregoing, to illustrate the motive and significance of these remarkable carvings.

Commemorative columns.—There are two classes of these (1), commemorative proper and (2) mortuary. It has been explained, in the description of Fig. 292, that the upper group of figures commemorates a real or supposed incident in the kidnapping of two Indian children by the white traders. It is the generally accepted opinion that these columns are in no sense historical, but purely ancestral or totemic. This claim is entirely too sweeping. Fig. 293 shows the details of a column erected in front of the feast house of the famous Kaigani Chief Skowl at Kasa-an. This is in the rear of the living house, on the back street, so to speak. In front of the latter is his totemic column, a tall, slender, finely carved one, surmounted by his totem, the eagle, resting on seven disks or skil, as shown in Plate III. The feast house column (Fig. 293) is surmounted by Skowl's crest, the eagle. Just below it is a carved figure of a man with right hand uplifted and index finger pointing to the sky. It signifies that in the heavens God dwells—the God of the white man. Below this is the representation of an angel as conceived by the Indians from the description of the whites, and then comes a large figure intended to picture a Russian missionary with hands piously folded across the breast. This group

of the figure with uplifted hand, the angel, and the missionary, commemorates the failure of the Russian priests to convert Skowl's people to their faith, and was erected in ridicule and derision of the religion of the white man. Below this group is a magnificent carving of a spread eagle, and at the bottom of the column a figure intended to represent one of the early traders on the coast. Skowl was always an enemy to the missionary and resisted their encroachments to the last, being remarkable for his wealth, obesity, and intemperate habits. He weighed at the time of his death, in the winter of 1882-'83, considerably over 300 pounds. As a young man, his physical prowess, wealth, and family influence, made his tyrannical rule at Kasa-an one long to be remembered, as he did much to keep his people to the old faith and to preserve amongst them the manners and customs of his forefathers. Plate LXVII is a sketch of this chief lying in state in his lodge at Kasa-an village, from a photograph taken by the writer in 1885. To illustrate further the nature of some of these commemorative columns, it may be well to mention here the case of Chief "Bear Skin," of Skidegate, Queen Charlotte Islands, British Columbia, as cited by Judge Swan. "Bear Skin," on his return from a visit to Victoria, British Columbia, had erected in front of his house two wooden effigies of Judge Pemberton of that city to show his contempt for him as a magistrate for putting him in the lockup at Victoria. In the Berlin Museum is a small slate carving, illustrated in Fig. 275, Plate LI, which commemorates the prowess of a certain medicine man who came up to Skidegate from Klue village to work his charms on two dead men. He was observed by numerous witnesses to squat upon their graves, and by invoking the power of his *yakes* with rattles, masks, and songs, to raise them from the dead. Coming to life, they clung to him as in the image. This incident is of course vouched for by reliable witnesses, but no further testimony is needed to insure its acceptance as gospel by the Indians than that it should be thus carved in slate. It lifts the story to the first rank as a tradition to be handed down as long as the image shall recall it or the Indian mind cherish the recollection of it. It can not be claimed that a good case has been made out in the illustrations here cited to show that these columns and carvings are ever historical in the strict sense of the word, but they are, nevertheless, at times commemorative of certain real or supposedly real incidents, and the statement that they are never historical at least needs qualification.

Mortuary columns.—A broad distinction is drawn here between columns that in themselves form a mode of sepulture and those which are commemorative and erected at some distance from the site of the grave in which the body is interred. The former are described in detail in Chapter XII, on Mortuary Customs; the latter are in imitation of the former, and preserve the shadow of the primitive mode of sepulture just as to-day the funeral urn on a modern grave is symbolical of the old custom of cremation. These are illustrated in Fig. 1, Plate II, Fig. 179*e*, Plate

XXXV, and in Plates LV, LXIV, and LXIX, as well as in the general views of Kasa an village. They are erected usually near the corner of the house at one side, and consist, as a rule, of a short stout post or column surmounted by a carved representation of the crest or totem of the deceased. The erection of these takes place at the ceremony known as the "glorification or elevation of the dead," described in Chapter XIII. After the body has been entombed it is incumbent on the heir of the deceased, if the latter has been a person of any importance, to make a feast and erect one of these commemorative columns. In the southern part of the Queen Charlotte Islands a very common form of this column is a short stout post with a sign-board-like square formed of split planks carved on the outer face. This kind is rare to the north, and not seen at all amongst the Kaigani, as far as known to the writer.

The decay of totemic carving.—Amongst the northern Tlingit these carved columns of all kinds have largely disappeared. At Sitka only the stumps of the ancient ones are now found. Wherever the missionaries have gained influence with these Indians the totemic columns have gradually disappeared and the old ways been given up. Of the Tlingit villages which have retained many of the primitive customs Tongass (Tunghaash) is the most representative. Kasa-an stands at the head of the Kaigani and Skidegate of the Haida villages in this respect. Wars, epidemics, and emigration have reduced the population to such an extent that former sites have been abandoned and the Indians are gradually concentrating into a few villages. Graves, ruins, decaying houses, grass-grown village sites, graphically picture the results of the contact of the coast Indians with our civilization.

Slate carvings.—The slate from which the elaborate Haida carvings are made is obtained at the Slate Creek, Queen Charlotte Islands. It has the desirable quality of being soft and easily carved when freshly quarried, and of hardening and taking a polish after exposure to the weather for some time. The general range of these carvings in boxes, dishes, pipes, and models is shown in Plates XLIV, XLVII, and XLVIII. Sometimes highly polished copper and the iridescent shell of haliotis, and sometimes bone or ivory, are inlaid to represent eyes, teeth, etc. The finest specimen of Haida sculpture known to the writer is that illustrated in Plates XLIX and L. Numerous other kinds of carvings in bone, ivory, and slate, used as talismans or doctor's charms are not illustrated here, being left for separate treatment under the head of Shaman Paraphernalia and Shamanistic Rites.

MUSIC.*

Singing.—While in recent years, in the decay of the ceremonial institutions of the Indians of this region, the custom of singing has some-

* In Pilling's Bibliography of North American Languages is mentioned a manuscript of 500 pages in Russian and Tlingit of vocabularies, texts, sentences, songs, etc., in the Tlingit language of Sitka. Unfortunately this manuscript was inaccessible, being in the hands of its author, Mr. Alphonse Pinart.

what died out, in early days they were passionately addicted to the practice. In the ceremonies of welcome, of war and peace, of trade, and of all the endless social gatherings of these exceedingly sociable people, singing was the invariable accompaniment. Dixon (1787) says:

When the traffic of the day is pretty well over, they begin to sing and never leave off till the approach of night; thus beginning and ending the day in the same manner. * * * It must be allowed that their songs are performed with regularity and in good time, but they are entirely destitute of that pleasing modulation and harmony of cadence which we had usually been accustomed to hear in the songs at other parts of the coast.*

Marchand (1791) says that amongst the Haida, at fixed times morning and evening, they sing in chorus, in which every one takes part. Poole says of their singing: "a peculiar plaintiveness of tone and a quaint hitch of the voice at the end of each line redeems the so-called singing from the charge of inflicting torture on human ears."† He gives in this connection a Haida caroling song, which is a repetition of the words given below like the note B in the Key of E. The notes to the two upper lines are semi-breves, those to the under line crotchets, thus:

Equàl—ah, ah, ah, ah, hè, hè hè, *andante*.

Equàl—ah, ah, ah, ah, hè, hè, hè, *crescendo*.

Equàl—ah, equàl—ah, hè, hè, hè, *decrescendo*.

Plate LVI is a trading song, sung by the Sitka Indians in 1787, as reproduced in Dixon's Voyage, page 243, and described in Chapter VIII of this paper. Fig. 300 is a song of the Haida, used as an accompaniment to their ceremonial dances reproduced from Poole's Queen Charlotte Islands, page 322.

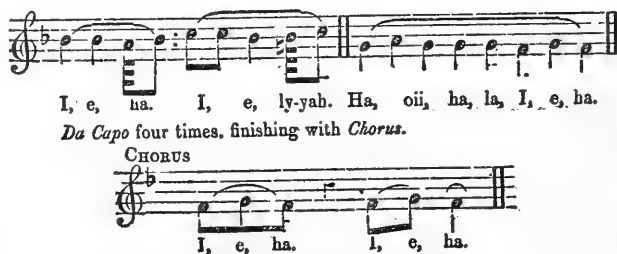


Fig. 300.

SONG OF THE HAIDA.

(From Poole.)

The dance songs in this region of the coast are accompanied by the beating of drums and the spasmodic shaking of rattles. Amongst the Tlingit the women rarely dance, but sit at some distance from the dancers, "and sing a not inharmonious melody, which supplies the place of music." ‡

* Dixon, Voyage, p. 188.

† Poole, Queen Charlotte Islands, British Columbia, p. 323.

‡ Langsdorff voyages, Pt. I, p. 114.

EXPLANATION OF PLATE LVI.

INDIAN SONG.

INDIAN SONG, as generally sung by the natives of Norfolk Sound (Sitkan tribe) previous to commencing trade. Reproduced from Dixon's *Voyage*, page 243, and explained in Chapter VIII of this paper.

Indian Song as generally Sung by the Natives of
NORFOLK SOUND
 previous to commencing trade

The musical score is presented in four systems, each with three staves. The top staff is for the 'Chief of the tribe' (soprano), the middle for 'Women' (alto), and the bottom for 'Men' (bass). The time signature is 3/4. The lyrics are written below the notes.

System 1:

- Chief of the tribe: Al-la coofch hoh hoh hoh
- Women: (rest)
- Men: Haigh al - la coofch al - la

System 2:

- Chief of the tribe: hoh hoh hoh hoh hoh hoh hoh
- Women: coofch al - la haigh ha haigh haigh haigh haigh ha
- Men: (rest)

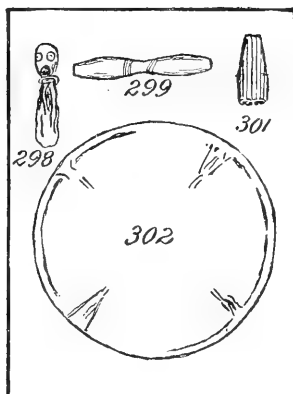
System 3:

- Chief of the tribe: hoh hoh hoh hoh hoh hoh hoh hoh hoh hoh
- Women: haigh haigh haigh ha haigh ha haigh
- Men: (rest)

System 4:

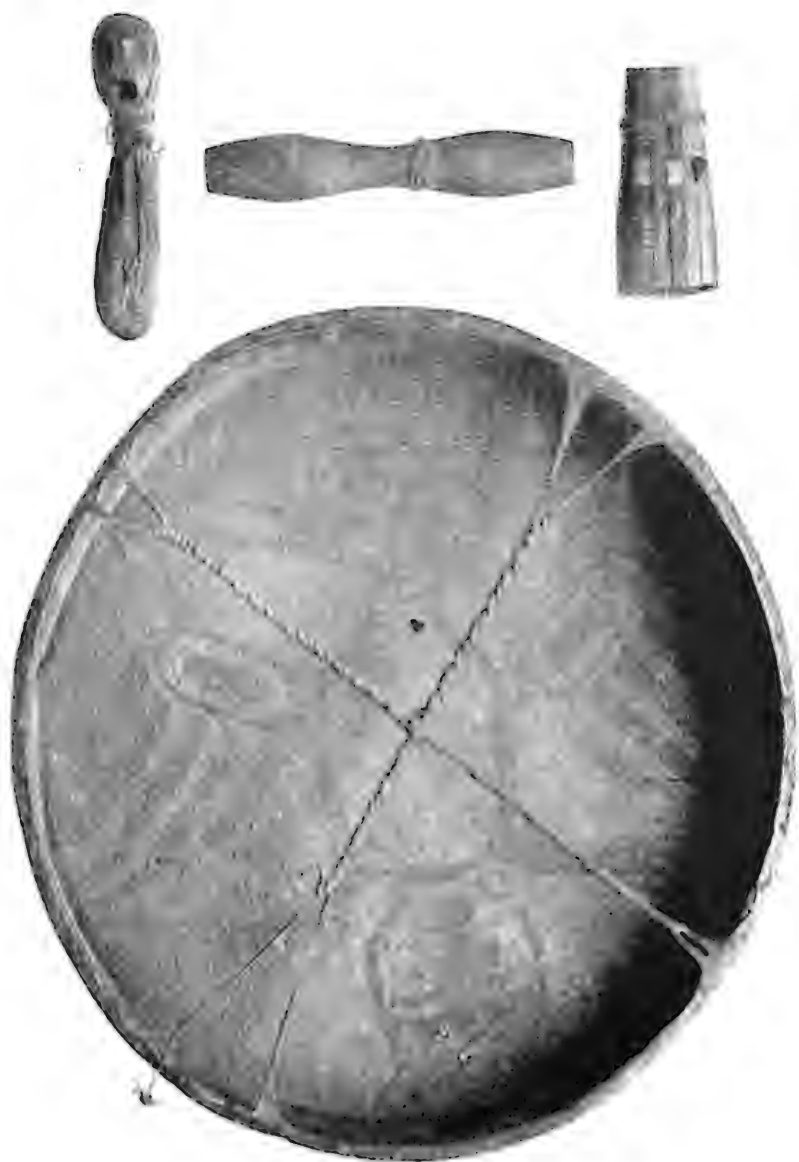
- Chief of the tribe: hoh hoh hoh
- Women: haigh haigh ha haigh ha haigh haigh haigh
- Men: (rest)

EXPLANATION OF PLATE LVII



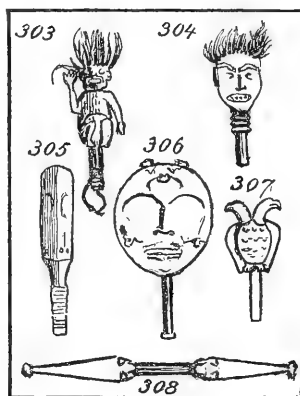
MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST.

- Fig. 298. DANCE WHISTLE. In form of a toy balloon, with a bladder attached to the wooden mouth-piece to operate the whistle. Cat. No. 89069, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 299. DANCE WHISTLE. Blown like a fife. Compare Fig. 326. Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 301. CEREMONIAL TRUMPET. Made in six pieces (see Fig. 319), which, when joined, form six chambers, in each of which a piece of fabric is stretched. The different tones are not set to a scale. Cat. No. 20687, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan.
- Fig. 302. MEDICINE AND DANCE DRUM. Tanned sheep-skin stretched over a wooden frame. Totemic figure, the bear. It is beaten with an ordinary stick padded with cloth. Cat. No. 127613, U. S. N. M. Tlingit, Sitka, Alaska. Collected by Paymaster E. B. Webster, U. S. Navy.



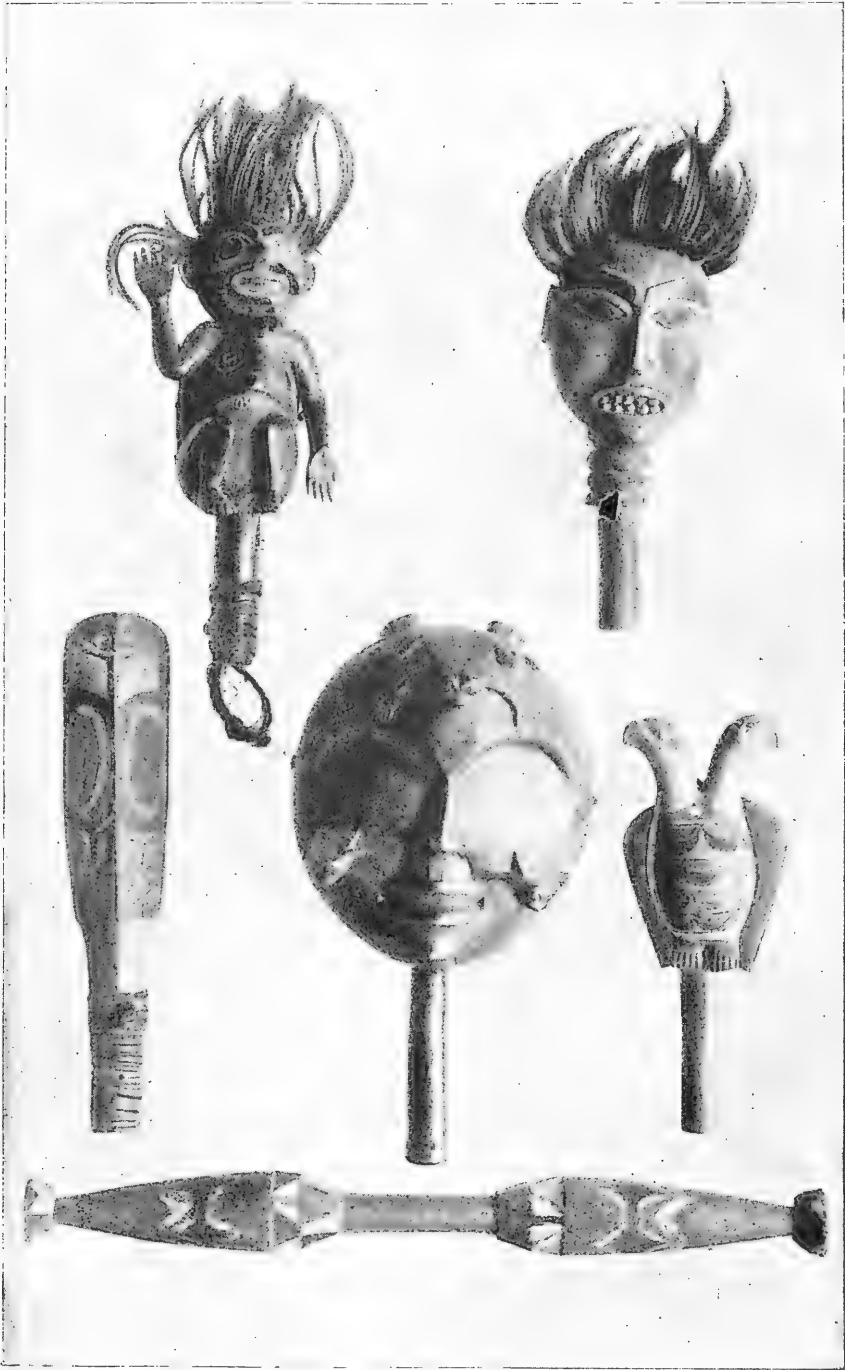
MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE LVIII.



CEREMONIAL RATTLES FROM THE NORTHWEST COAST.

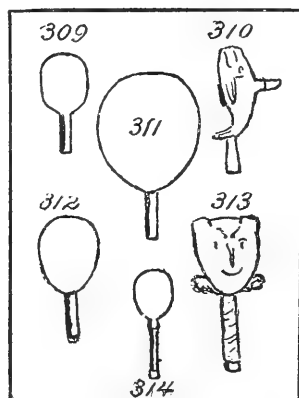
- Fig. 303. SHAMAN DANCE RATTLE. Of wood; ornamented with human hair. Cat. No. 9257, U. S. N. M. Tlingit Indians, Sitka, Alaska. Collected by Dr. A. H. Hoff, U. S. Army.
- Fig. 304. DANCE RATTLE. Wood; ornamented with human hair and opercula. Cat. No. 73853, U. S. N. M. Tlingit Indians, Alaska. Collected by Lieut. T. Dix Bolles, U. S. Navy.
- Fig. 305. SNAPPER. Of two pieces of wood hinged just above the wrapped handle and carved. Carried in ceremonial dances. Cat. No. 73796, U. S. N. M. Tlingit Indians, Hoonyah, Alaska. Collected by Lieut. T. Dix Bolles, U. S. Navy.
- Fig. 306. RATTLE. Of wood; carved to represent a legend which explains how toads and frogs come with the rain. The latter is shown as springing from the eyes of T'kul, the spirit of the wind. Cat. No. 20583, U. S. N. M. Tsimshian Indians, Port Simpson, British Columbia. Collected by James G. Swan.
- Fig. 307. RATTLE. Under side view of ceremonial rattle representing the double-headed eagle. This design undoubtedly originated from the imitation of the Russian standard. Cat. No. 20762, U. S. N. M. Sitka, Alaska. Collected by James G. Swan.
- Fig. 308. DANCE RATTLE. Rare design and peculiar pattern. Cat. No. 74336, U. S. N. M. Tlingit Indians, Alaska. Collected by John J. McLean.



CEREMONIAL RATTLES FROM THE NORTHWEST COAST.



EXPLANATION OF PLATE LIX.



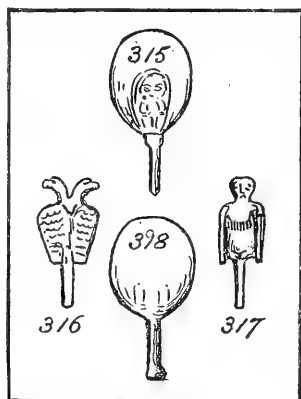
CEREMONIAL DANCE-RATTLES FROM THE NORTHWEST COAST.

- Fig. 309. DANCE RATTLE. In shape of Hoorts, the bear. Cat. No. 88796, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 310. CARVED RATTLE. In shape of the orca or whale-killer, showing dorsal fin and formidable teeth. Cat. No. 20758, U. S. N. M. Tlingit, Sitka. Collected by James G. Swan.
- Fig. 311. CARVED RATTLE. In form of cockle shell. Cat. No. 74333, U. S. N. M. Tlingit, Sitka. Collected by John J. McLean.
- Fig. 312. DANCE RATTLE. Of wood. Used by Shamans. Cat. No. 89084, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 313. DANCE RATTLE. Showing Hoorts, the bear, with protruding tongue, so common in Haida drawings. Cat. No. 89076, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 314. CEREMONIAL RATTLE. Of wood; ornamented in painted designs. Cat. No. 88718, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



CEREMONIAL DANCE-RATTLES FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE LX.



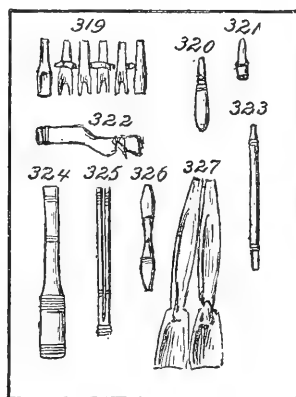
CEREMONIAL DANCE-RATTLES FROM THE NORTHWEST COAST.

- Fig. 315. SHAMAN'S DANCE RATTLE. *Skaga sisha*. Haida. Formerly owned by Tsilwak, a medicine man of Gold Harbor, Queen Charlotte Islands, British Columbia. Cat. No. 89052, U. S. N. M. Collected by James G. Swan.
- Fig. 316. RATTLE. Same as Fig. 307, Plate LVIII. Cat. No. 20762, U. S. N. M. Sitka, Alaska. Collected by James G. Swan.
- Fig. 317. RATTLE. Of wood; carved to represent the fish-hawk. Cat. No. 88727, U. S. N. M. Haida Indians, Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 318. RATTLE. Back view of Fig. 306, Plate LVIII. Cat. No. 20583, U. S. N. M. Collected by James G. Swan.



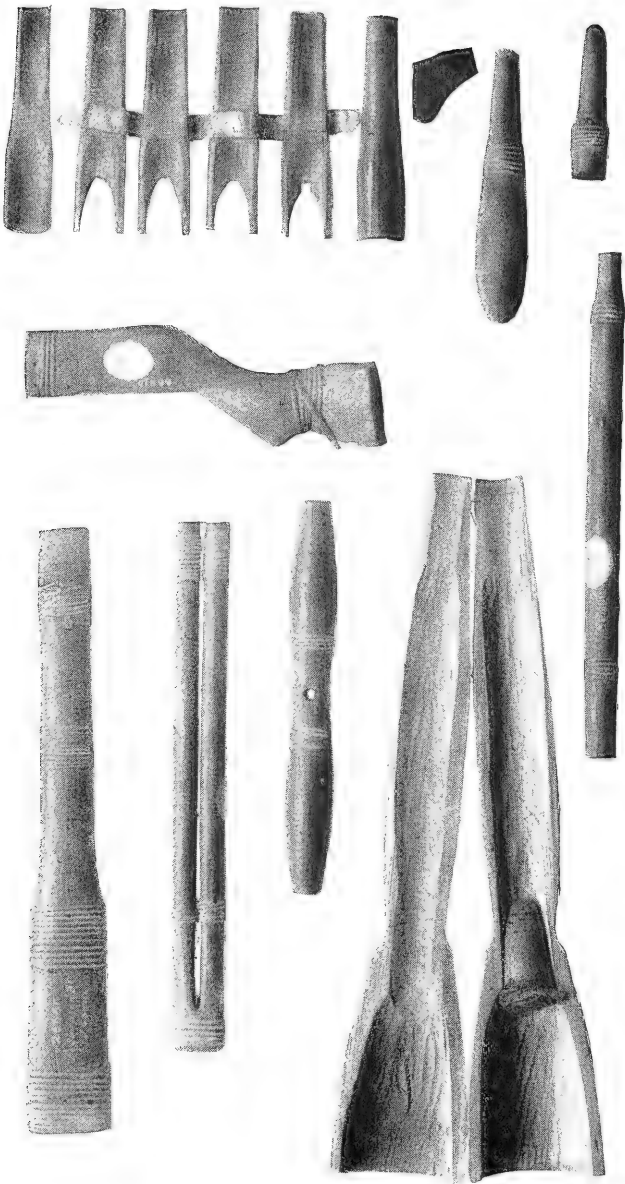
CEREMONIAL DANCE-RATTLES FROM THE NORTHWEST COAST.

EXPLANATION OF PLATE LXI.



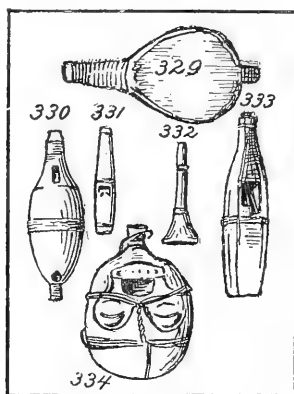
MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST—WOODEN WHISTLES AND TRUMPETS.

- Fig. 319. WOODEN TRUMPET. Five-chambered. Compare Plate LVII, Fig. 301.
- Fig. 320. CEREMONIAL WHISTLE. Of wood, with wooden reed in the mouth-piece. Blown like a flageolet. Cat. No. 89059, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 321. CEREMONIAL WHISTLE. Compare Fig. 320. Cat. No. 88879, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 322. CEREMONIAL WHISTLE. Cat. No. 88876, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 323. CEREMONIAL WHISTLE. Cylindrical, with wooden reed in mouth-piece. Cat. No. 88893a, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 324. CEREMONIAL TRUMPET. Of wood; made in two sections with reed between. Compare Fig. 329. Cat. No. 20689, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan.
- Fig. 325. DOUBLE CEREMONIAL WHISTLE. Compare Fig. 323. Cat. No. 88873, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 326. CEREMONIAL WHISTLE. See Plate LVII, Fig. 299, Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 327. CEREMONIAL TRUMPET. Of wood; in section, to show the vibrating piece. Cat. No. 20695, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan.



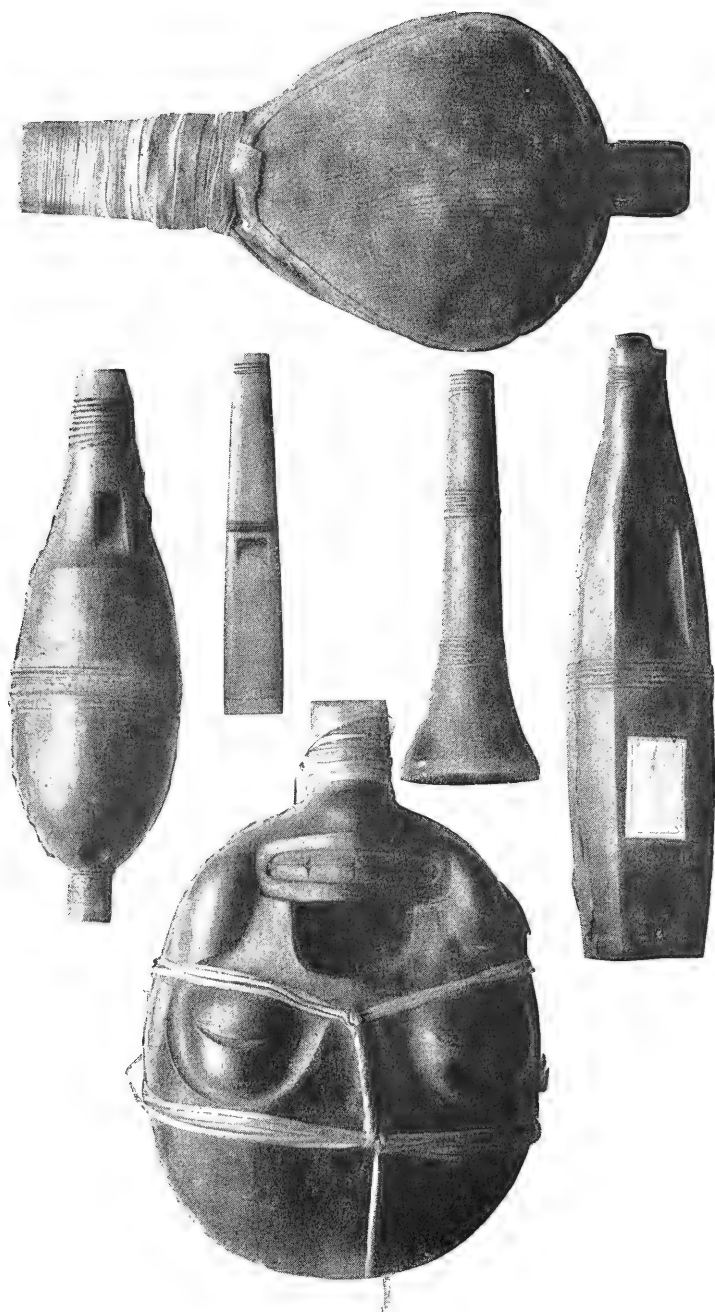
MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST—WOODEN WHISTLES AND TRUMPETS.

EXPLANATION OF PLATE LXII.



MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST—WOODEN WHISTLES AND TRUMPETS.

- Fig. 329. DANCE WHISTLE. With double reed mouth-pieces backed with bellows. The cheeks of the bellows are painted, representing Hoorts, the bear. Cat. No. 89064, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.
- Fig. 330. DANCE WHISTLE. Of wood; principle of a policeman's whistle. Cat. No. 89067, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 331. WHISTLE. Of wood. Cat. No. 89093, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 332. TRUMPET. Wooden tube, with vibrating reed. Cat. No. 88895, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 333. WHISTLE. (See Fig. 330.) Cat. No. 89066, U. S. N. M. Haida Indians, Skidegate, British Columbia. Collected by James G. Swan.
- Fig. 334. WHISTLE. Spapakwilli or Oolalla's (the mountain demon's) call. Used only at the commencement of great and important ceremonies to announce the beginning of the distribution of property in the potlatch. Cat. No. 89062, U. S. N. M. Skedan's village, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



MUSICAL INSTRUMENTS FROM THE NORTHWEST COAST—WOODEN WHISTLES AND TRUMPETS.

Additional notes on the subject of singing will be given in Chapter XIII, in the description of the various ceremonies.

Drums.—Portlock (1787) says of a Tlingit chief whom he traded with :

He was not for transacting his business in a hurry; and perhaps he thought that on his last visit we were not impressed with a sufficient idea of his importance; for now he came along-side, with his party, in great pomp and solemnity, all of them singing; and in addition to the vocal concert, they entertained us with instrumental music, which consisted of a large old chest, beaten with the hands, by way of a drum, and two rattles. The rattles were 2 feet long, and about 2 inches round, made of hollow pieces of wood neatly joined together, and a number of small stones being put in, they were closed at both ends. The chief held one of these rattles in his hand, which he frequently shook with an air of meaning intelligence, and the rest of his tribe seemed to follow his directions in singing in the most exact manner.

* The usual type of drum, however, is that shown in Fig. 302, Plate LVII, which consists of a piece of deer-hide or sheep-skin stretched across a circular hoop.

Rattles.—These are usually made of cedar wood, generally in sections neatly joined together, and elaborately carved and painted in totemic designs. There are two kinds, snappers and rattles proper. Snappers are usually made in two pieces hinged together in such a way that by pulling a string or jerking it bodily, the two parts come together with a snapping noise. Often these are carved in the form of the head of some animal with enormous teeth and jaws, controlled by a string, being very effective in amusing the multitude when carried in the native dances. The most primitive rattle, mentioned by the early voyagers, is that shown in Fig. 73, Plate XVIII, composed of two hoops joined by a wooden cross-piece, the circumference being closely strung with the beaks of the puffin. The usual form of rattle is a hollow wooden chamber with about a dozen small pebbles in it. The forms, variety of carving, and general shapes are so great that only a few typical ones are illustrated in the accompanying plates (LVIII, LIX, and LX). They are carried in the hand on ceremonial occasions, and serve by their noise to accentuate the measured time of the music in the dance. Those shown in the plates are described in detail in the legend accompanying each.

Whistles.—These are shown in great variety in Figs. 298, 299, and 301, and in Plates LXI and LXII. While they are not, in one sense, musical instruments, not being capable of giving forth more than two or three distinct notes, yet they serve the purpose of the Indians, although they do not speak very highly for their advancement in a musical way. Some of their devices of this kind are essentially for the purpose of making a hideous noise, such, for instance, as that in Fig. 298, consisting of a wooden whistle and a bladder like a toy balloon, or, Fig. 329, consisting of a whistle backed by a pair of bellows to furnish the wind. Such instruments are essentially for "cultus" dances, or those intended to amuse the populace. Others are highly ceremonial in their nature.

* Portlock, Voyage, p. 282.

The most elaborate one of this kind is shown in Figs. 301, Plate LVIII, and 319, Plate LXI, both being views of the same instrument, the latter in detail and the former put together for use. It consists of six pieces of wood, forming a kind of trumpet, with five openings. Through these is stretched a continuous narrow band of silk. When blown through it gives forth a noise like a deer call, each section being pitched slightly different, although not in any musical scale. Fig. 299, of which Fig. 326, Plate LXI, is another view, is a whistle pure and simple, being blown by applying the lips as in a fife. The other instruments shown are blown like a flageolet, some of them having several finger-holes to change the note. Fig. 324 has a reed or vibrating piece within, as shown in one section of corresponding type in Fig. 327. Dawson states that among the Haida "certain secrets are reputed to appertain to the office of chief, among which is the possession of various articles of property which are supposed to be mysterious and unknown to the rest of the Indians, or common people. * * * * When my informant was about to engage in the dance, the chief took him aside, showing him various articles of the mysterious *chief's properties*, among others a peculiar whistle, or cell with vibrating reed tongues, which, concealed in the mouth, enables the operator to produce strange and startling noises, that may be supposed by those not in the secret to indicate a species of possession in the excited dancer. These things are explained by the chief to his probable successor, and are also known to some of the more important Indians, but not to all. They are, no doubt, among the devices for obtaining and holding authority over the credulous vulgar." *

SUMMARY.

It can not be said that in a musical way, according to our standard, these Indians have made much progress, but the music, such as it is, has the nature of an accompaniment to their dancing, or is at least subordinate to other forms of entertainment. Instrumental music pure and simple, as an enjoyment in itself, is practically unknown, but the passion of these Indians for vocal music has been commented upon by nearly every visitor to the coast who has published the account of his experiences. In the art of painting, drawing, carving, and sculpture they stand at the head of the savage tribes of the world. In the wealth of their traditions, in the abundance of their industrial products, in the range of their capabilities as a people, there is so much that is worthy of illustration and description that what has been said here seems as but the bare outline of a subject worthy of the special study of all ethnologists.

* Dawson, Report, B, p. 120.

VIII.

PRODUCTIONS, LOCOMOTION, WEALTH, AND TRADE.

PRODUCTIONS : REARING AND CULTIVATION.

Rearing.—The only domestic animal is the Indian dog. It resembles the wolf, having a sharp nose, a long bushy tail, and being in fact a cross-breed from the wolf.* The Indians are remarkably fond of them, and, in every canoe, three or four may be seen sticking their sharp muzzles over the gunwale. The poorer the Indian the greater the number of dogs he owns. Practically they are not of very great use to their masters; they occasionally run down deer in the winter and are used to hunt bear, but are very badly trained, as they are allowed to bark furiously on scenting a trail and are very cowardly. They are, however, of little care to their owner, as they pick up their own food from around the refuse of the tide, camp, and village. The pure strain has been crossed with the cur dogs of the whites and the present result is a degenerate variety. Bancroft is authority for the statement that "Dogs of a peculiar breed, now nearly extinct, were shorn each year, furnishing a long white hair, which, mixed with fine hemp and cedar, made the best cloth."†

Cultivation.—The only thing cultivated amongst the Tlingit, Haida, and Tsimshian, before the advent of the whites, was a species of narcotic plant similar to tobacco, but about which it is difficult to obtain definite information. Vancouver (1793) first saw it at Kootznahoo or Admiralty Island, and of it he says:

On each side of the entrance some new habitations were constructing, and, for the first time during our intercourse with the Northwest American Indians, in the vicinity of these habitations were found some square patches of ground in a state of cultivation, producing a plant that appeared to be a species of tobacco, and which we understood is by no means uncommon amongst the inhabitants of Queen Charlotte's Islands, who cultivate much of this plant.‡

All the evidence points to the Haida as being the chief cultivators of this species of tobacco plant. To-day one finds stored away in the out-of-the-way nooks in the older houses huge stone mortars, in which this weed was pounded up for use. (Plate LXIII, Fig. 339). It was not smoked, as may be supposed, but chewed or held in the cheek. Its preparation consisted in drying it, pounding it in a mortar, and press-

* Dunn, Oregon, p. 290.

† Bancroft, Vol. I., Native Races, p. 166.

‡ Vancouver, Voyage, Vol. III., p. 256.

ing it into plugs or cakes. Lime, made from burnt clam-shells, was mixed with it to give a good "bite." The practice of smoking came in with the whites, and our tobacco has completely replaced the native article, which is now only cultivated, if at all, in the most remote regions, and the writer was unable to obtain any specimens of it.

Gardens.—Around all the villages garden patches may now be seen. The principal vegetable cultivated is the potato, although turnips and a few others are found occasionally. The Haida in particular cultivate potatoes in large quantities to trade on the mainland.

LOCOMOTION: CANOE TRAVEL.

From the diversified nature of the country and the numerous inland water-ways, travel is of necessity by canoe. It is unnecessary to treat of the subject here after what has been said under the titles of tents, tents, p. 304, and canoes, p. 294.

WEALTH: CURRENCY, PROPERTY, SLAVES, LAND.

Primitive wealth—Before the advent of the whites, wealth consisted in the possession of sea-otter skins, hunting and fishing grounds, slaves, and household and personal property, such as dance paraphernalia, household furniture, hunting and fishing implements, canoes, houses, and articles of trade. Practically, however, the unit of value was the sea-otter skin, as it was also the basis of wealth. As the Haida were the most expert hunters of this animal in this region, they became in time the most wealthy and influential people on the coast. The principal changes in the forms of wealth have been in the substitution of blankets for skins and furs and the abolition of slavery. Otherwise the enumeration of articles of wealth is as given above.

Currency—Amongst the interior Indians of North America the beaver skin was the medium of exchange. In the trade between the coast Indians and those of the interior, the dentalium shell was valued by the latter, who gave in exchange the abalone shell so highly prized by the former. Amongst the coast Indians themselves, as stated, the sea-otter skin was the basis of exchange, although the shell currency seems to have had a relative value. This latter lost its function when the whites began to import such quantities of shell later on. These have, however, remained as a favorite ornament, occupying somewhat the place of jewels amongst civilized people. With the almost total disappearance of the sea-otter through the greed of Indian and white man alike, a new currency sprang up. It happened that, through the competition in trade between the French, English, Americans, and Russians, success crowned the English through the superiority of the material which they offered in trade, and with the establishment of the Hudson Bay Company their blankets, through uniformity and excellence in grading, became the recognized currency. These vary from

"one point," the poorest, to "four points," the best. These "points" are woven into the texture on the edge, and it has happened that the "two-and-a-half point" has come to be the unit, valued now at about \$1.50. Just as in former times, as the sea-otter skins were stored away representing so much wealth, so to-day the blankets are folded and packed away in their boxes. They are generally received at face value by all traders when unused and in good condition. The value of everything is referred to the unit blanket. A four point blanket is worth so many blankets (two-and-one-half point), and the cost of everything is reckoned in the same way.

Property in land.—Throughout this region the coast line, streams, estuaries, and adjacent lakes are divided amongst the different families, the right of possession descending from one generation to another as personal property. The larger salmon streams are sometimes jointly owned by several families, or owned by one family and leased for a consideration to one or several others. Stranded marine animals, or other débris washed by the tide, belong to the family owning that portion of the shore line, the boundaries of possessions being definitely marked and respected accordingly. Nor is this boundary confined to the strip of coast, but extends well out to sea, carrying with it the right to shoot seals and gather birds' eggs on outlying rocks, hunt sea-otter, and to fish on well-known halibut or cod banks.

Major Powell says: "Land tenure does not begin in grants from the monarch or the feudal lord, but a system of tenure in common by gentes or tribes is developed into a system of tenure in severalty." * This is admirably illustrated in this region, for the ownership of a tract of land by a family has come, through being vested in an individual or the head of that family, to mean practically individual ownership. Dawson gives an instance on Queen Charlotte Islands where a rich tract of country called *Tl-ell*, which had come into the possession of a former Chief of Skidegate as the property of his wife, "was afterwards given by him to the Skedans of that day as a peace-offering for the wounding or killing of one of his (Skedans) women. The tract thus now belongs to Skedans, and is valued as a berry ground." †

Disputes over ownership of land, boundaries, etc., have been the cause of many feuds. At Thom Bay, adjoining Tolstoi Bay, Prince of Wales Island, Alaska, a valuable tract of hunting and fishing ground is in dispute between the Stikines and Kaigani, both tribes in true American style having up "No trespassing" signs on the trees.

Coppers.—Throughout the Northwest coast copper plates or "coppers" of a conventional pattern are valued as emblems or tokens of wealth, and have been handed down for generations. They originally came from the Chilkat country, where virgin copper is found in considerable quantities, and are made in the form of a shield from $2\frac{1}{2}$ to $3\frac{1}{2}$

* Annual Report, Bureau of Ethnology, 1879-'80, p. 83.

† Dawson, Report, B, p. 165.

feet in length, 12 to 25 inches in width, and one-sixteenth to one-eighth of an inch in thickness. They have a groove running vertically in the lower half and transversely across the middle at the narrow part, forming a figure like the letter T. They are sometimes painted, but more commonly etched on the outer surface with the design of the crest or totem of the owner. If they ever served as shields in battle such use has long since disappeared, and now they have only a ceremonial or emblematic significance. To be of great value these plates must be large, of virgin copper, worked by hand, of native manufacture, of uniform thickness, except at the edges, where they should be thicker than elsewhere; and, finally, when struck should give forth a dull sound and not ring. Totemic etching on the outer surface also adds value to them. Modern "coppers" of European manufacture are not very highly prized, as compared with the ancient ones. Lisiansky (1804) says that amongst the Tlingit they were "only possessed by the rich, who give for one of them from twenty to thirty sea-otter skins. They are carried by their servants before their masters on different occasions of ceremony, and are beaten upon so as to serve as a musical instrument. The value of the plate depends, it seems, on its being made of virgin copper, for the common ones do not bear a higher price than a single skin."* The best, according to Dunn (1834), were worth around Dixon Entrance nine slaves, and were transmitted as a price for their loom.† Now they are valued at from forty to eighty blankets. They are called by the Kaigani *T'ow*, and are shown in Plate LXVII. Dr. Boas says of them:

"They are given as presents by one tribe to another. The Indians value a copper-plate the more the more frequently it has been given as a present. Every single plate has its name and its own house, and is fed regularly. No woman is allowed to enter its house. Almost every tribe has a tradition referring to their origin. Some say that a man who visited the moon received it from the man in the moon. Others say a chief living far into the ocean gave it to a man who came to visit him, etc. Similar legends refer to the halotis shells which are used for ear and nose ornaments and bracelets."‡

This may be the custom with regard to copper plates amongst the southern coast tribes, but it differs materially from that of the Tlingit, Haida, and Tsimshian. With them they are simply tokens of wealth. These are shown in Plate LXVII as forming no inconsiderable portion of the wealth of Chief Skowl, amounting to hundreds of blankets. Dawson says that amongst the Tsimshian these coppers are exhibited in a circle in upright position at the ceremony of "bringing out" a young girl, who sits within the circle and sings.§

Amongst the Kaigani these *t'ow* are often displayed over the grave of a deceased person of wealth. One is shown in Plate III, left of upper view. Some miles below the village of Kasa-an, on Prince of

* Lisiansky, Voyage, p. 150.

† Dunn, Oregon, p. 288.

‡ Notes on the Ethnology of British Columbia (Amer. Philo. Society, Nov. 18, 1887), p. 427.

§ Dawson, Report, B, p. 131.

Wales Island, one is nailed to a tree on a point of land to mark the locality where a canoe was upset and the occupants drowned. Lisiansky, as quoted, shows that they were occasionally used by the Tlingit as a sort of gong or musical instrument, being carried before the chiefs by the slaves and beaten upon.

The change in the articles of value accumulated and stowed away as wealth is illustrated by an incident in the summer of 1886, where some white men robbed a *cache* of the Klawak chief *Tin-ga-ate* of all its contents to the value of over \$2,000. The booty included five hundred blankets, fifty wash-bowls, thirty-six mirrors, six valuable dancing robes, and many other articles. It may be mentioned in this connection that the wash-bowls are used as receptacles for food, and are taking the place of the native wooden bowls.

TRADE: EXCHANGE OF COMMODITIES.

Port Simpson, from its central location at the head of Dixon Entrance, has come to be the great emporium of trade for the surrounding region. Dunn says that, in 1834, the Haida, Nass, Kaigani, Tongass, Port Stewart and Stikines generally rendezvoused there in the month of September to trade.* Simpson estimates that, in 1841, about four thousand from the various tribes of Stikines on the north to the Tassara on the south, resorted there, although many of them merely paid passing visits en route to the Nass River to fish for eulachon.†

In earlier days, previous to the advent of the whites, the trading was carried on less systematically and with more formality on account of the feuds between the different tribes. The Indians of this whole region are expert traders. Every article purchased undergoes the closest scrutiny. Every defect is discovered and the value scaled down accordingly. If once a certain price is obtained for a commodity of theirs it is adhered to thereafter as the set price, and the knowledge of such value travels fast. Time and distance are unimportant factors in a bargain. If 200 miles farther on the price paid for a commodity is considerably greater, the distance is reckoned as nothing in going there to get the difference. On the other hand, in purchasing goods from the traders, they show rare good sense in their selection of the better qualities, mere cheapness being in itself no recommendation. From the earliest times they have preferred articles of use to trinkets. Dixon (1787) says that they refused beads with contempt. What Vancouver said of the Tlingit or the Kaigani of Prince of Wales Island, in 1794, applies with equal force to-day:

In all the commercial transactions the women took a very principal part, and proved themselves by no means unequal to the task. Nor did it appear that either in these or in any other respect they were inferior to the men; on the contrary, it should rather seem that they are looked up to as the superior sex, for they appeared in general to keep the men in awe and under subjection.‡

* Dunn, Oregon, p. 281. † Simpson, Journey Round the World, Vol. I, p. 206.

‡ Vancouver, Voyage, Vol. II, p. 409.

Dixon (1787) says of the Sitka Indians:

The chief of the tribe has always the entire management of all the trade belonging to his people, and takes infinite pains to dispose of their furs advantageously. * * * The moment a chief has concluded a bargain he repeats the word *Coo coo* twice, with quickness, and is immediately answered by all the people in his canoe with the word *Whoah*, pronounced in a tone of exclamation, but with greater or less energy, in proportion as the bargain he had made is approved. *

In general notes on the northwest coast the same author says:

Whenever any large party came to trade these treasurers [dance paraphernalia] were first produced, and the principal persons dressed out in all their finery before the singing commenced. In addition to this, the chief (who always conducts the vocal concert) puts on a large coat, made of elk skin, tanned, round the lower part of which is one or sometimes two rows of dried berries or the beaks of birds, which make a rattling noise whenever he moves. In his hand he has a rattle, or more commonly a contrivance to answer the same end, which is of a circular form, about 9 inches in diameter, and made of three small sticks bent round at different distances from each other; great numbers of birds' beaks and dried berries are tied to this curious instrument, which is shaken by the chief with great glee, and in his opinion makes no small addition to the concert. Their songs generally consist of several stanzas, to each of which is added a chorus. The beginning of each stanza is given out by the chief alone, after which both men and women join and sing in octaves, beating time regularly with their hands or paddles; meanwhile the chief shakes his rattle and makes a thousand ridiculous gesticulations, singing at intervals in different notes from the rest; and this mirth generally continues near half an hour without intermission.†

The song which was usually sung on such occasions is reproduced from the same volume (p. 243), in Plate LVI.

As mentioned, the course of the slave trade was from the south to the north and from the coast inland. The Tsimshian were the middle men, and were, and are still, the great traders in oil and grease, of which they prepare large quantities from the eulachon, seal blubber, deer and goat flesh. Computed in blankets, the eulachon grease or oil now brings one blanket for from 10 to 15 pounds. With the disappearance of the sea-otter, the Haida, with great foresight and judgment, began the cultivation of the potato, which was first introduced amongst them by an American ship-captain. Dunn (1834) says: "I have known from 500 to 800 bushels being traded in one season from these Indians (Haida) at Fort Simpson."‡ It is not unusual now to see fleets of canoes coming in from the Queen Charlotte Islands bringing potatoes, etc., and towing new canoes to trade or sell. The Hudson Bay Company now has a "guest house" near its post, to accommodate the visiting Indians who come to trade with them. Ordinarily, however, the visiting Indians are the guests of their own gens at the Tsimshian village near by. Large fleets now also visit Victoria each spring and fall from the north, not only to trade, but too often, unfortunately, for immoral purposes.

* Dixon, Voyage, p. 189.

† *Ibid.*, pp. 242, 243.

‡ Dunn, Oregon, p. 204.

SUMMARY.

Rank and social standing amongst these Indians being based largely upon the possession and distribution of wealth, it is not surprising to find a uniform currency amongst the different tribes, and a regular system of exchange or trade based on considerations both of supply and demand, and of the adaptability of certain tribes or regions to the production of certain things needed in other parts of the coast. The advent of the whites and the abolition of slavery have destroyed in a measure the tendency towards feudalism in the village communities, due to the possession of property and lands by a few families, and practically changed the development of their tribal organization into a tendency towards industrialism or division into trades crafts. This tendency is seen to-day in the adoption of certain trades by the Indians and the gradual breaking up of the old system of household organization for industrial purposes. The writer once asked an Indian who was loafing around Fort Wrangell in the summer doing nothing, while most of the other Indians were off in summer camp or working in the canneries, how business was, and he answered "very dull." When asked what his business was, he replied "Oh, eberyting." As a matter of fact he was a canoe-man, carrying freight up the Stikine River, and at odd times chopped wood for a living. The capabilities of these Indians in a business way is well illustrated by an incident which the writer witnessed at Port Townsend, Washington Territory, early in October of 1886. It was just at the end of the hop-picking season around Puget Sound, and hundreds of Indians were coming in to Port Townsend en route to their villages to the north. A party of young Haida stopped, and one of their number telegraphed over to Whidby Island to offer the services of the party to a farmer to dig potatoes for him. In view of the glut in the labor market, due to the presence of so many idle Indians just then, this clever bit of enterprise showed an appreciation of the telegraph in a way that needs no further comment other than that they secured the job ahead of all rivals.

IX.

WAR AND PEACE.

As a rule, the feuds between gentes, phratries, and tribes in this region have originated from such causes as gambling quarrels, failure to pay indemnity for wrongs done, or breaches of custom or etiquette, for the observance of which all are great sticklers. Their wars have been characterized by treachery, surprise, ambush, night attack, superior numbers on the aggressive side, massacre of women and children, impressment into slavery of the prisoners of war, and scalping of the slain enemies. Fair fight, excepting in duels, seems to have been unknown or unrecognized. The ceremonies attending both warlike and peaceful demonstrations have always been of an elaborate character, and, as has been pointed out, many of the existing elaborate ceremonies, with the accompanying paraphernalia, are survivals of practices originating in war. Since the military occupation of Alaska by our Government, and the suppression of slavery throughout the north-west coast, Indian wars have practically ceased; and, in describing the practices of war, it becomes necessary to speak in the past tense.

WAR CUSTOMS.

In preparation for war the men painted the body, powdered the hair with eagle's down, and got themselves up in the most hideous attire. The wooden masks, helmets, and armor were carried in the war canoes, ready to be put on for an encounter; and the war parties consisted usually of both freemen and slaves. The war canoes were generally steered by some old crone whose courage and influence had been found oftentimes to be of the greatest incitement to the warriors. From various accounts, it would appear that, in early times, when two hostile canoe parties met accidentally, preparations for the encounter consisted in putting on the masks and war garments, throwing overboard the dogs, and cautious advance, accompanied by songs, menacing speeches, and gestures. Arrows, missiles, and even bullets (after the introduction of fire-arms) were avoided by gently heeling the canoe and interposing its gunwale as a protection. In an encounter, the victorious usually slaughtered their opponents, scalped them, and cut off their heads, either sticking up the latter on poles to grace their triumph or carrying them off to prevent the friends of the deceased from recovering them. In the first encounter of the Russian commanders Lisiansky and Baranoff with the Sitka Indians, in 1804, the latter remained in possession of the battle-field, and the bodies of the

slain Russians and Aleuts were displayed by the Indians, borne aloft on spears. Subsequently they were compelled by the Russians to abandon their fort, which they did secretly at night, first killing their dogs and young children to prevent their noise giving notice of their flight.*

Vancouver (1794) mentions an encounter between some Kaigani Indians, who were on board ship trading with him, and some Stikine who suddenly appeared, coming around a point of land. The former rushed into their canoes, which were alongside, put on their war garments, and rested their spears on the gunwale. Thus prepared, they advanced slowly to meet the new-comers, meanwhile making the most violent and passionate speeches, which were answered in a similar tone by some persons who stood up in the Stikine canoe. After a parley, lasting some moments, an amicable understanding was reached, and both parties returned to the ship, though on their guard towards each other. At the head of the Stikines was the great chief *O-non nis toy*, who, with all his party, for safety, slept on board the *Discovery*, while the Kaigani went to their camp on shore. In the morning the Stikine went on shore with great ceremony and arranged with the Kaigani a combined entertainment for the benefit of Vancouver, which they gave alongside in their canoes. "It consisted in singing and a display of the most rude and extravagant gestures that can be imagined. The principal parts were performed by the chiefs, each in succession becoming the leader or hero of the song; at several pauses of which I [Vancouver] was presented by the exhibiting chief with a sea-otter skin." †

SCALPING AND OTHER WAR CUSTOMS.

The scalps of the slain were usually removed by the medicine men, or shamans, who accompanied the war party. Poole (1864) says that he saw "at least a hundred scalps in Chief Klue's lodge, on a pole." ‡ Dall states that, amongst the Tlingit, the scalps were woven into a kind of garter by the victor. § On the death of a chief of great prowess, the scalps which he had taken were sometimes used to decorate his tomb. ||

"Once I saw a party of Kaigany's of about two hundred men returning from war. The paddles of the warriors killed in the fight were lashed upright in their various seats, so that from a long distance the number of the fallen could be ascertained; and on each mast of the canoes—and some had three—was stuck the head of a slain foe." ¶

Simpson thus describes a feud at Sitka (1841), growing out of a drunken quarrel between a chief and a man of rank, in which the former stabbed the latter to death:

The party of the deceased, to the number of about a thousand men, immediately turned out, with horrible yells, to revenge his death, painted in the most hideous

* Lisiansky, Voyage, pp. 158 and 162.

|| Whymper, Alaska, p. 79.

† Vancouver, Voyage, Vol. II, p. 393-4.

¶ Bendel's Aleutian Archipelago, p. 30,

‡ Queen Charlotte Islands, p. 116.

quoted by Bancroft, Vol. I, p. 164.

§ Dall, Alaska, p. 417.

manner and armed with all sorts of weapons, such as spears, bludgeons, dirks, and fire-arms; while the women, more ferocious, if possible, than the warriors themselves, were exciting the tumultuary band to actual violence by the most fiendish screams and gestures * * * The chief's life was demanded in atonement, but refused by his party as being of more value than that of the person slain. * * * The parties met with a loud war-whoop; for a minute or two a clashing of arms was heard; and when both sides simultaneously receded from the spot, we beheld the bodies of two slaves that had been sacrificed in lieu of the chief. *

This atoned for the outrage and satisfied the requirements of blood revenge.

Dunn (1835) mentions a feud between the Port Stewart and Tongass Indians, in the course of which the latter cut off a war party of thirty of the former and massacred them.† In the Port Stewart region, Vancouver (1793) has left a record for all time of the character of this tribe in the names given to Traitor's Cove and Escape Point, commemorative of his hostile encounter with them, and his narrative makes them out to have been the most villainous Indians on the coast.‡ Simpson (1841) says that between the Haida of Queen Charlotte Islands, and the Bella Bella, a deadly feud had long subsisted :

About six weeks before our arrival, the latter, to the number of three hundred, had attacked a village of the former, butchering all the inhabitants but one man and one woman. These two the victorious chief was carrying away as living trophies of his triumph; * * * while standing in a boastful manner on the gunwale of his canoe, and vowing all sorts of vengeance against his victims, he was shot down by a desperate effort of his male prisoner. The Bella Bellas, their joy being now turned into grief, cut the throats of the prisoners, threw their spoils overboard, and returned home rather as fugitives than as conquerors. §

Poole (1863), speaking of the ravages of small-pox on the coast, says :

The Bella-Bella tribe, though not to be despised, were formerly by no means a match for their born foes the Bella Coolas, who used always to cut off a great number of the Bella-Bella whenever these ventured from their own territory. But now the Bella-Bella, though deplorably reduced in their own tribe, found themselves in numbers and force far ahead of the Bella Coolas, and were accordingly preparing, might and main, to administer condign punishment to their ancient enemies. ||

DUELS.

Duels or trials by combat were sometimes resorted to not only in case of dispute between individuals, but to settle feuds between families or gentes. The combatants protected their bodies with thick leather shirts and wooden armor outside; wore masks and helmets of wood; and, armed with daggers, stepped forth to the encounter, encouraged by the songs and cries of their friends.

PEACE CUSTOMS.

On the approach of a canoe or party the intention of which is at first doubtful, the token of peace was the blowing in the air of white feath-

* Simpson, *Journey*, Vol. II, p. 205-6.

§ Simpson, *Journey*, Vol. I, p. 203.

† Dunn, *Oregon*, p. 290.

|| Poole, *Queen Charlotte Islands*, p. 185.

‡ Vancouver, *Voyage*, Vol. II, pp. 358 to 366.

ers plucked from an eagle's skin, or by the display of a tuft of white feathers on the end of a pole or at the mast head of the canoe.* In the friendly dances and ceremonies of welcome a fan or tuft of white eagle feathers was carried in token of friendship and peace.

TREATIES OF PEACE.

At a conclusion of peace it was the custom to exchange hostages in token of good faith. Dall says of them :

These are obliged to eat with their left hands for a certain period, as they carried weapons in the right hand during combat. Each hostage has two companions of equal rank assigned to him by the tribe which holds him.†

Lisiansky (1804) says of the hostages sent by the Sitka to the Russian forces :

They were in one canoe, and sung as they approached a sort of song of a melancholy strain. On landing, the hostage threw himself flat on his back in the shallow water, according to the custom of the country, and continued in this posture till some of our people arrived who were sent to lift him up and conduct him.‡

In general the treaties of peace were ratified by feasts and elaborate ceremonies often lasting many days.

*Vancouver, Voyage, Vol. II, p. 389; and Dixon, Voyage, p. 180.

†Dall, Alaska, p. 417.

‡Lisiansky, Voyage, p. 156.

X.

VICES AND DEMORALIZATION OF THE INDIANS—GAMBLING—RUM—TOBACCO—IMMORALITY.

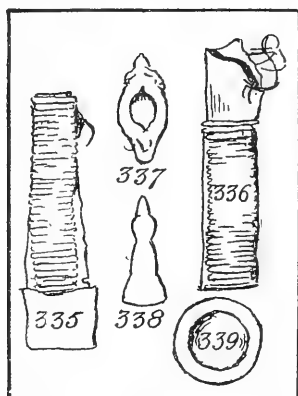
Before the advent of the whites gambling, immorality, and the use of tobacco, although not unknown, were at least not such pronounced vices as they have come to be under the stimulus of contact with civilization. The use of liquor was, however, quite unknown. Langsdorff, who was at Sitka in 1805, says of the Tlingit: "Brandy, which is sometimes offered them by the Russians, they reject as a scandalous liquor, depriving them of their senses."* It would have been of great advantage to them if they had continued to so regard it. Unfortunately the example of the whites and the deliberate corruption of the Indians by unscrupulous traders have made them in recent years only too well acquainted with the evils of rum drinking. Just now they are beginning to rally from the demoralization due to contact with the whites and to adjust themselves philosophically to their changed environment. The former custom of chewing tobacco, in vogue from the earliest times, has now given way almost entirely to that of smoking the weed which they buy from the traders. In Chapter VIII, "Rearing and Cultivation," the production and preparation of the native tobacco has been fully described. Although in one sense a vice, the use of tobacco can hardly be said to have contributed much to the real demoralization of the Indians.

GAMBLING.

The Haida, Tsimshian, and Tlingit are inveterate gamblers. During the winter leisure or whenever, for any reason, they are gathered together in considerable numbers, gambling is the invariable and constant amusement, often continuing for several days on a stretch without rest or intermission. These bouts are usually conducted on the platform in front of the houses in good weather, but indoors in bad. The gamblers sit on the ground or squat about the platform in a circle, in the centre of which a clean mat of the inner bark of the cedar is spread. Each man produces a bag containing from thirty to fifty round sticks or pins about 5 inches long by three-eighths or one-half of an inch in diameter, and beautifully polished and carved in totemic design or painted in black, blue, and red rings. One of the players, selecting a number of these pins from his bag, covers them up in a heap of finely

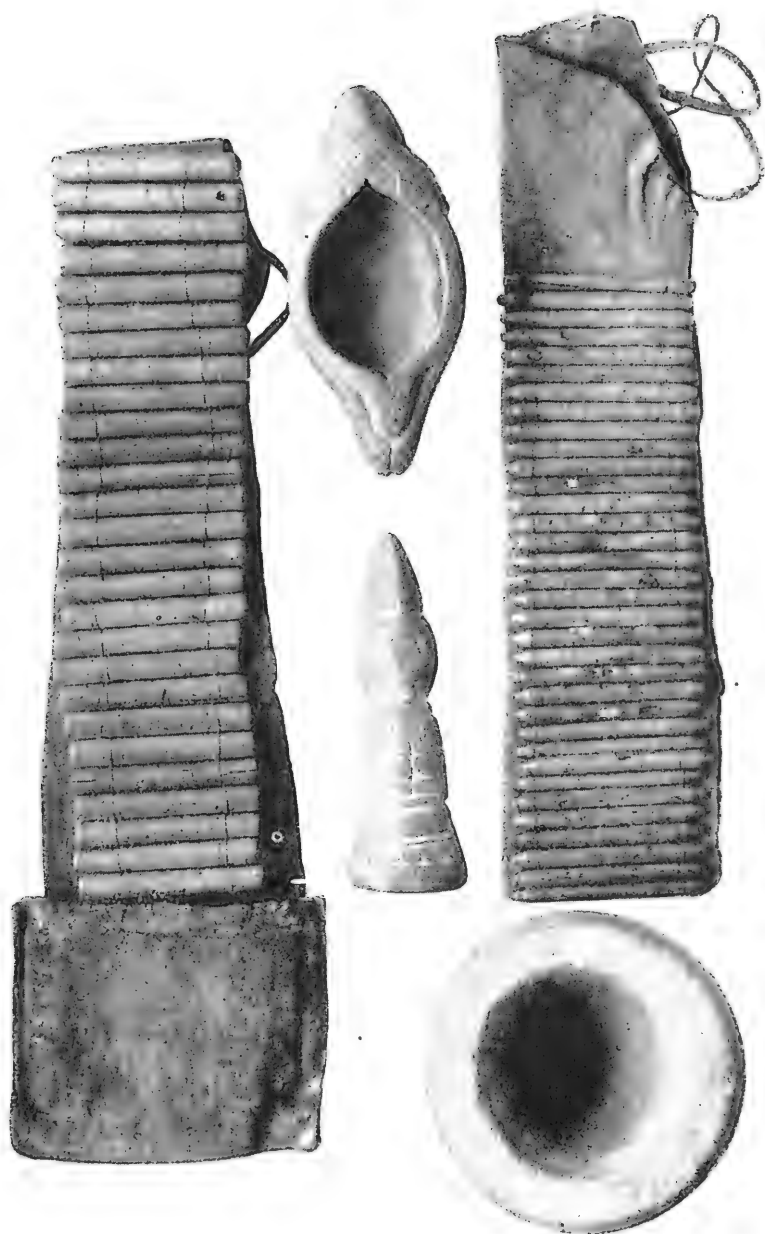
* Langsdorff, *Voyages*, pt. II, p. 131.

EXPLANATION OF PLATE LXIII.

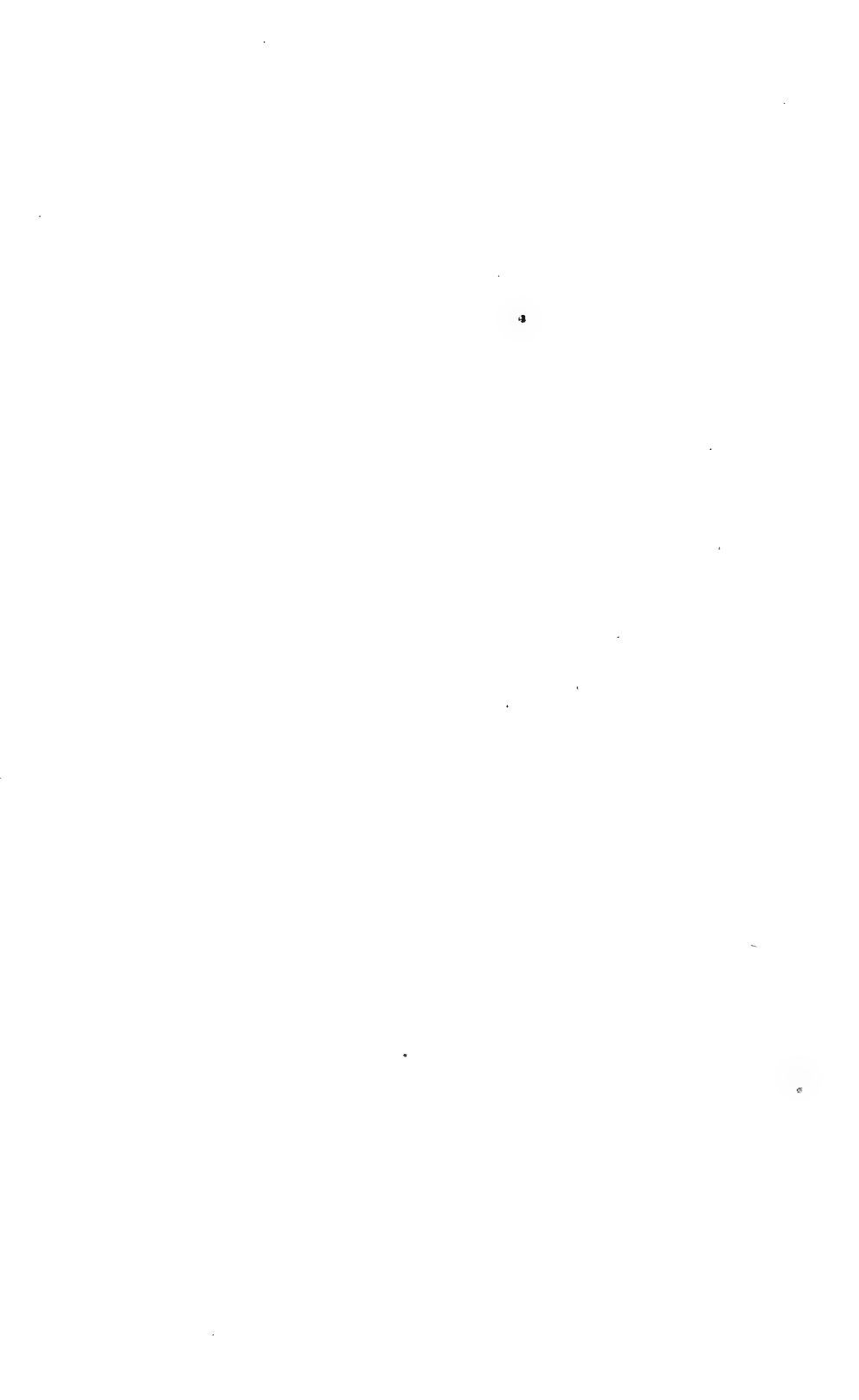


GAMBLING STICKS; MORTARS AND CARVED PESTLE FOR PREPARING NATIVE TOBACCO.

- Fig. 335. GAMBLING STICKS. Of wood; twenty-four in number, with deer-skin bag. Each stick is carved with a totemic design. Cat. No. 6556, U. S. N. M. Tlingit, Sitka. Collected by Dr. T. T. Minor, U. S. Army.
- Fig. 336. GAMBLING STICKS. Of wood; thirty-four in number; polished and inlaid with abalone. Cat. No. 20789, U. S. N. M. Tlingit, Sitka. Collected by James G. Swan.
- Fig. 337. STONE MORTAR. Ancient pattern; for grinding native tobacco for chewing. Cat. No. 45961, U. S. N. M. Tlingit, Sitka. Collected by John J. McLean.
- Fig. 338. STONE PESTLE. In shape of the raven; for preparing native tobacco. Cat. No. 67849, U. S. N. M. Tlingit, Hoodsinoo, Alaska. Collected by John J. McLean.
- Fig. 339. STONE MORTAR. Of calcite, with totemic designs on the exterior; for preparing native tobacco. Smaller examples used in grinding paint. Cat. No. 88823, U. S. N. M. Masset, Queen Charlotte Islands, British Columbia. Collected by James G. Swan.



GAMBLING STICKS; MORTARS AND CARVED PESTLE FOR PREPARING NATIVE TOBACCO.



cut bark tow. The workings and significances of these sticks is perfectly understood, and the game is either odd or even, or to guess in which of two piles a certain stick is hidden. Poole thus describes the game among the Haida:

One of the players, selecting a number of these pins, covers them up in a heap of bark cut into fibre-like tow. Under cover of the bark he then divides the pins into two parcels and having taken them out passes them several times from his right hand to his left, or the contrary. While the player shuffles he repeats the word *I-E-Ly-Yah* to a low monotonous chant or moan. The moment he finishes the incantation, his opponent, who has been silently watching him, chooses the parcel where he thinks the luck lies for odd or even. After which the second player takes his innings, with his own pins and the same ceremonies. This goes on till one or the other loses all his pins. That decides the game.*

Another form of this is for the player to shuffle together all the pins and count out seven. The game is to guess in which pile a certain pin is, say the one carved like a beaver, or whale, or eagle. The fortunate guesser gets one or more pins according to rule, or, if he fails, pays a forfeit of so many pins. The Indians stoically sit for hours conning over the melancholy chant, apparently indifferent to loss, gain, time, or hunger, often losing everything he owns in the world without the slightest expression of emotion. Poole mentions the case of a Haida chief who continued playing for three days without eating a mouthful of food, but perpetually losing. By the fourth day he had even parted with the blanket on his back, when a woman of his tribe, taking pity on him, loaned him her only blanket, and he renewed the contest, this time successfully, not only winning back what he had lost, but finally getting all his opponent's property, consisting of powder and shot, muskets, revolvers, blankets, skins, paints, tobacco, fish, etc.*

Two sets of gambling sticks are shown in Plate LXIII, Figs. 335 and 336. For convenience of illustration they are laid out on the wrapper of the wallet in which they are usually kept. The carving on some of the more expensive sets is of the very highest order.

Rum.—Impure, monstrosly vile liquor has been the greatest curse to the Indians of this region. Having furs and other valuable products sought by the traders, the latter have been only too ready to debauch and despoil them. In all the criminal record of shameless commercial conquest of a rich and prosperous territory, no region has suffered more unless it be the Aleutian Islands in earlier days. This can not be laid at the door of any of the large commercial companies, for in the main such a policy is suicidal to their own interests. With the small dealers, the owners of small trading craft, those whose only thought and interest has been the business in hand, the policy has been one of unscrupulous rum selling. Poole (1863) says:

The so-called whiskey which is shamelessly sold to the Indians by traders along the coast or even by certain unprincipled merchants of Victoria, contains very little of what is wholesome or genuine liquor. What it really does contain is not generally

* Poole, Queen Charlotte Islands, p. 319.

known, but I hear on good authority that the bulk consists of water flavored and colored with grain whiskey in the smallest possible quantities. Its strength proceeds wholly from the blue-stone, vitriol, and nitric acid which the manufacturers largely infuse into it. The consequence is that when the Indians imbibe this drink freely—and they always do so whenever they can get it—their naturally fiery temperaments are wrought up into a state of savagery so intense as to leave no white man's life safe in their presence while they remain under its influence. *

The orgies and debauchery of the Indians up to recent years have been something to shock even the most hardened trader. Liquor being obtained in quantities, either by the distillation of sugar or molasses or purchased from the traders, a systematic plan of getting drunk in detachments was practised and is to-day in certain regions when they can get the liquor. It is the duty of those sober about the village to look out for the drunk and tend to the various household duties, look after the canoes, children, etc. When the first detachment has sobered up the others sometimes take their turn. Pandemonium reigns, and it often takes the intervention of the whites to get things going smoothly again. Unfortunately the women are worse drunkards than the men, and it is in their demoralization that the Indians have suffered most. The *hoochinoo*, which they make themselves, is not a native invention, as the process has been picked up from the whites. It has flourished amongst the Tlingit since our acquisition of Alaska in 1867, and common report credits its introduction to American officials. *Hoochinoo* is simply a distillation from potatoes. The still generally consists of a square tin kerosene can, with a worm, made either of tin pipe or the stems of the giant kelp. The worm is either packed with snow or placed in a stream of fresh water. The mash is made from potatoes, which are cooked, dumped into a tub, and allowed to ferment, a little sugar or very cheap molasses being added to produce the alcohol. It suffers only one distillation, and the horrible product is taken in its raw state, the effect being to almost instantly rob an Indian of his senses. Largely through the influence and authority exerted by the commanding officers of our men-of-war before the establishment of the civil government in Alaska the practice of distilling *hoochinoo* has been greatly broken up and decidedly discouraged. †

Immorality.—The chief demoralization in this region has been amongst the women, brought about by the independent position they occupy in the social organization of the tribe, by the peculiar laws or customs relating to marriage by purchase, and by the right to return a female to her people in case she proves unsatisfactory or undesirable. Through the influx of whites, due to the establishment of industries, the prosecution of trade, and the development of mineral resources, the Indians have been brought in close contact with most unrefined elements of our civilization. Money earned in the summer months by these adventurous

* Poole, Queen Charlotte Islands, p. 313.

† Notes on the distillation of *hoochinoo* were kindly furnished the writer by Lieut. N. R. Usher, U. S. Navy.

spirits is squandered in the most reckless dissipation about the various settlements in the winter months. Jealousy being unknown amongst the Indians, and sanctioned prostitution a common evil, the woman who can earn the greatest number of blankets or the largest sums of money wins the admiration of others for herself, and a high position for her husband by reason of her wealth. It is not an uncommon thing for whole families to resort to the settlements for the winter, and return to their villages in the spring to give grand potlatches with their ill-gotten gains. The influence of the missionaries and of the respectable element in the settlements has, from the first, been used against the extension and growth of this evil, but it can not be said that, until in the last few years, much progress has been made in stemming this tide of reckless physical and moral debasement. Its effects are seen in the alarming number of deaths due to dissipation, and the great decrease in the ratio of births to deaths throughout this whole northern region. The part which rum has played in causing this havoc is not to be underestimated, and it is fortunate that a steadily growing sentiment is making itself felt towards the suppression of these two alarming evils.

SUMMARY.

The native vices of these Indians are simply those due to savagism. Contact with the whites has, through the greed for wealth operating on both sides, produced an abnormal departure from primitive ways. Gambling is found almost universally amongst savage tribes, and with progress in civilization, the first steps are always in the direction of the aggravation of primitive and the adoption of foreign vices. Rum drinking has been nowhere so disastrous as in this region. With the smoking of tobacco by the Indians of the Atlantic coast region, and the chewing of it by those on the northwest coast, it has remained for our civilization only to invent the snuffing of it. Peculiar marriage customs and the greed of wealth have here contributed more to the alarming increase of immorality than any inherent love of vice on the part of the Indians.

XI.

WITCHCRAFT—SUPERSTITION—SICKNESS AND DEATH—MEDICINES— TREATMENT OF THE SICK.

WITCHCRAFT.

All severe diseases or illnesses are ascribed to the evil influence of enemies, and, in case of the death of an important personage, a victim is usually found who has presumably charmed away the life of the deceased. The Indians are intensely superstitious and have naturally been encouraged in ideas of this kind by both the chiefs and the shamans, whose sway over the tribe depends largely upon the fear and respect excited by belief in their influence and power over good and evil spirits. Largely through the action of the commanding officers of our men-of-war stationed in Alaska, this hold of the chiefs and shamans on the people has been broken. By the bombardment and destruction of several villages the Indians have been compelled to abandon the punishment of victims accused of witchcraft, but the chief stumbling block has been the surprising admission of guilt which nearly all of the accused Indians make when charged with charming away life, and this, too, in the face of the death penalty. Such is their credulity that when accused they believe they must be guilty. Amongst the Haida the guilty Indian, according to Judge Swan, is discovered as follows:

The mouse is the judge by which the Haida detect the persons who work bad magic and cause sickness and death. When a person is taken sick or dies, three men are selected who prepare themselves by pulverizing a dried frog, mixing it with salt water and drinking it. This decoction produces vomiting and purging, and when their systems are thoroughly cleansed their minds are supposed to be clear and better able to judge of the merits of the case about to be submitted to their decision. They next catch a wood-mouse and put it in a little cage, which is set on a raised platform in front of the judges. The little mouse, sadly frightened, retires to a corner of his cage and eyes the judges. They then commence naming over suspected persons, and presently the little mouse nods its head. The victim has to pay money or blankets to get clear. * * * (West Shore, August, 1884.)

A narration of the superstitious beliefs of these Indians would in itself exceed the limits of this paper. Charms of all kinds are worn and the most implicit faith is placed in the significance of dreams, signs, and omens. Certain forms are gone through with to propitiate the various spirits and invoke their aid in all enterprises. A consideration of this subject belongs properly to a study of the religious beliefs and practices of these Indians, which must come later.

SICKNESS.

In cases of serious illness chief reliance was, up to recent years, placed upon the incantations of the medicine men, who were paid liberally if the patient lived, or, if he died, were compelled to restore the goods he had previously received on account. If any one other than a shaman attempted to do anything to cure a sick person and the patient died, the self-constituted doctor had to pay a heavy indemnity to the person's relatives. In out-of-the-way villages the shamans still have a hold on the Indians, and in case of sickness one is called in by the head of the household. If the latter falls sick it devolves upon his brother or nearest male relative to call in the Indian doctor. On all such occasions friends are invited in to see the evil spirits exorcised. While these shamans possess some knowledge of the medicinal properties of herbs and are not slow to avail themselves of them, their duty is to drive out the evil spirit which haunts the sick man. Any virtue that medicines may in themselves have are ascribed to the charm supposed to be wrought by the doctors in their decoction or preparation. The incantations and exorcising consist in beating drums, dancing, making passes with subtle charms, blowing in the patient's mouth and nostrils, kneading and pounding his body, chanting, swinging to and fro, frothing at the mouth, and every conceivable practice foreign to our own ideas of the treatment of the sick. As a rule the patient that survives the din, foul air, and excitement of such a visit must needs have been on the high road to recovery, for the shaman usually continues this performance until the patient declares himself better or well.

The initiation, practices, rites, exhibitions, dances, and incantations of these medicine men deserve separate consideration as connected intimately with their religious beliefs and customs. In connection with witchcraft, it may be said that the shamans are supposed to possess the power of charming away life by incantations and the use of certain charms. In such cases, where the charge can be reasonably laid at their door, they are not beyond the reach of a kinsman's revenge.

MEDICINES.

The internal administration of native medicines is rarely practiced. Wounds and injuries are treated locally with several specifics known to them, and scarification is sometimes resorted to. Hemorrhages are stopped by the application of bird's down to the wounded parts. The healing qualities of pine and cedar are recognized, and pine-tree gum is applied as a poultice to wounds by some tribes. Salt-water taken as an emetic is a favorite remedy for those not feeling well. This is also taken when they wish to produce quickly that profound impression on body and mind which fasting brings about in preparation for some ordeal or ceremony. As stated, the virtue of any medicine administered

is supposed to be due to the charm wrought in it by the shaman or other person in its preparation or decoction. Preparations of bark are the principal specifics, but Langsdorff (1804) says of the Tlingit, "the root of a particular species of valerian is considered as the most effectual remedy that can be administered. * * * The wing bones [of the eagle], particularly the radius and ulna, are used in illness as tubes for sucking up fluids."* Around Sitka, the virtues of hot sulphur baths were recognized by the Indians long before the advent of the whites. Near that settlement are some natural hot springs impregnated with sulphur, salt, and magnesia. In addition to these, however, the Indians take steam baths by pouring water on red-hot stones in an enclosed tent or shed. In bathing and in some attempt at personal cleanliness, the Indians of the northern region of the northwest coast compare favorably with any of those in the world living in the temperate zone, but their ignorance of the simplest laws of health is child-like and lamentable.

* Langsdorff, *Voyages*, Pt. II, pp. 107 and 134.

XII.

MORTUARY CUSTOMS—ANCIENT SEPULTURE—DEPOSITORIES OF ASHES—MORTUARY COLUMNS—CUSTOMS OF THE TLINGIT, HAIDA, AND TSIMSHIAN—MODERN CUSTOMS—CHRISTIAN BURIAL—SHAMAN BURIAL.

ANCIENT SEPULTURE.

The earliest historical accounts are those of the early voyagers, and it is from these that we must get our descriptions of primitive methods of sepulture.

Dixon, who was amongst the Yakutat in June, 1787, says:

The manner in which they dispose of their dead is very remarkable. They separate the head from the body and wrapping them in furs, the head is put into a square box; the body in a kind of oblong chest. At each end of the chest which contains the body a thick pole, about 10 feet long, is drove into the earth in a slanting position, so that the upper ends meet together, and are very firmly lashed with a kind of rope prepared for the purpose. About 2 feet from the top of this arch a small piece of timber goes across, and is very neatly fitted to each pole; on this piece of timber the box which contains the head is fixed, and very strongly secured with rope; the box is frequently decorated with two or three rows of small shells, and sometimes teeth, which are let into the wood with great neatness and ingenuity; and, as an additional ornament, is painted with a variety of colors, but the poles are uniformly painted white. Sometimes these poles are fixed upright in the earth and on each side the body, but the head is always secured in the position described.*

Dixon also describes a grave discovered by one of his officers near Sitka: In a cave "he found the object which attracted his attention to be a square box with a human head in it," etc., beautifully ornamented with small shells somewhat like those at Yakutat.*

Portlock, who was also in this region in 1787, describes a grave just above Sitka as follows:

This edifice was composed of four posts, each about 20 feet long, stuck in the ground 6 feet distant from each other, and in a quadrangular form. About 12 or 15 feet from the ground there was a rough-boarded floor, and two of the sides were boarded 4 feet higher up; the other sides were left open. In the middle of this floor an Indian chest was deposited, which most likely contained the remains of some person of consequence; and on that side of the edifice to the westward, and which pointed up the sound, there was painted the semblance of a human face.

It is further described as showing evidence of having been recently repaired and the painting touched up.*

* Dixon, Voyage, pp. 175, 176.

† *Ibid.*, p. 181.

‡ Portlock, Voyage, p. 280.

Vancouver describes a Kootznahoo grave (Tlingit) which they saw on Admiralty Island, near Point Caution, in 1794, as follows :

They rested for the night in a small cove under a high hill, where a box was found about 4 feet square, placed on wooden pillars about 6 feet from the ground. This box contained the remains of a human body very carefully wrapped up, and by its side was erected a pole about 20 feet high, painted in horizontal streaks red and white; the colors were fresh and lively.*

Vancouver also describes as follows Kake Indian graves on Keku Strait, Kupreanoff Island, which he saw in 1794 :

In the vicinity of these ruins were many sepulchres or tombs, in which dead bodies were deposited. These were made with a degree of neatness seldom exhibited in the building of their habitations. A wooden frame was raised about 10 feet from the ground, the upper half of which was inclosed, and in the open part below in many, though not in all, of them was placed a canoe. The flooring of the upper part was about 5 feet from the ground, and above that the sides and top were entirely closed in with boards, within which were human bodies in boxes wrapped up in skins or in matting. These repositories of the dead were of different sizes, and some of them contained more bodies than the others; in the largest there were not more than four or five, lying by the side of each other, not one appearing to be placed above the rest; they were generally found near the water side, and very frequently on some conspicuous point. Many of these sacred monuments seemed to have been erected a great length of time, and the most ancient of them had evidently been repaired and strengthened by additional supporters of more modern workmanship. Hence it would appear that whatever might be the enmity that existed between the several tribes when living, their remains when dead were respected and suffered to rest quietly and unmolested.†

An earlier description (1793) by Vancouver of some graves up Behm canal, near Point Nelson, is as follows :

Near the ruins of a few temporary huts of the natives we found a box about 3 feet square and $1\frac{1}{2}$ feet deep, in which were the remains of a human skeleton, which appeared from the confused situation of the bones, either to have been cut to pieces, or thrust with great violence into this small space.

These were not numerous, and from the circumstances they concluded that only "certain persons" were thus entombed.‡

Another description by the same author (August, 1793) of a grave at cape Northumberland, Graving group, South Alaska, is as follows :

On a high detached rock were the remains of a large village, much more exposed to the inclemency of the weather than any residence of the natives I have before seen. Here we found a sepulchre of a peculiar character. It was a kind of vault, formed partly by the natural cavity of the rocks and partly by the rude artists of the country. It was lined with boards, and contained some fragments of warlike implements, lying near a square box covered with mats, and very curiously corded down.§

This description is similar to one given to the writer by Judge J. G. Swan, of Port Townsend, Washington Territory, as found by him in 1883, in a cave on North Island of the Queen Charlotte group.

From the descriptions that have been given it would appear that the primitive methods of sepulture in this region were far from uniform in their character. However, amongst those tribes which practised cre-

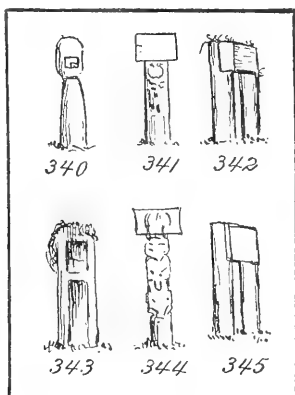
* Vancouver, Voyage, Vol. III, p. 260.

† *Ibid.*, p. 290.

‡ *Ibid.*, Vol. II, p. 351.

§ *Ibid.*, p. 370.

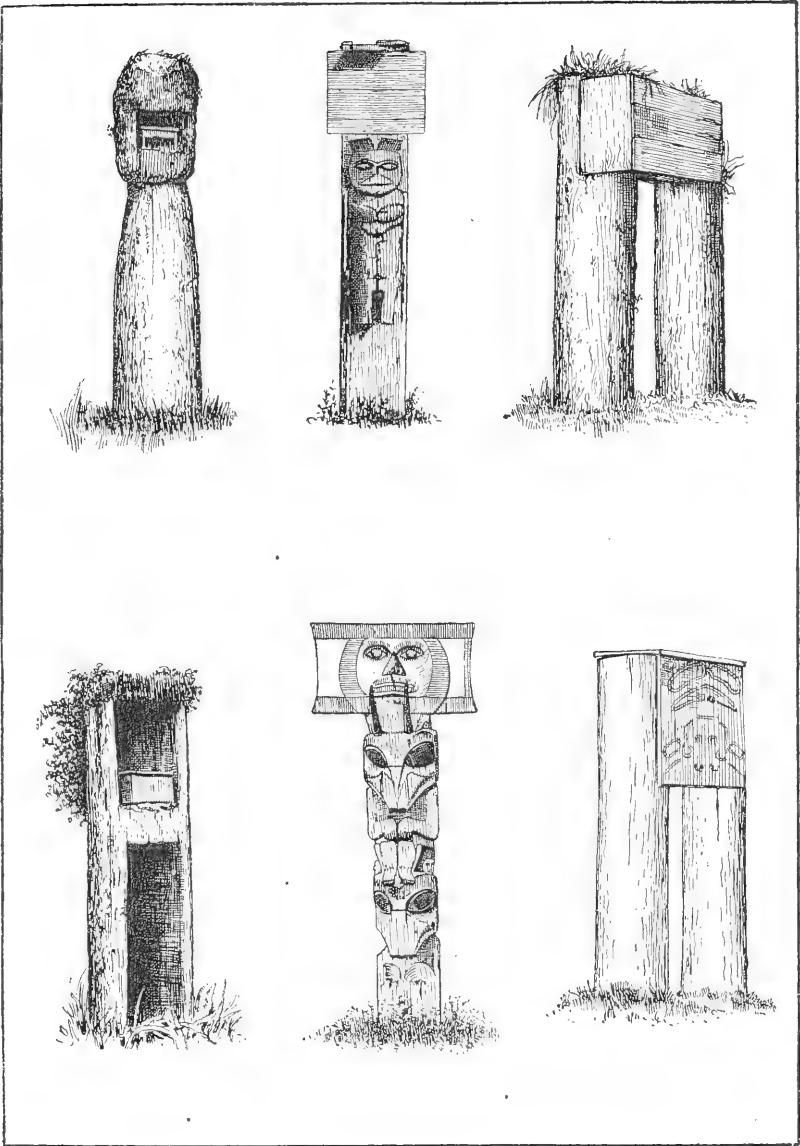
EXPLANATION OF PLATE LXIV.



HAIDA MORTUARY AND COMMEMORATIVE COLUMNS.

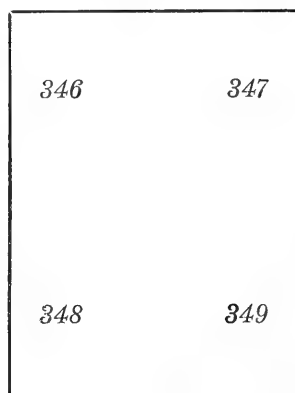
From photographs by the author and from sketches in the U. S. National Museum.

- Fig. 340. KAIGANI MORTUARY COLUMN, containing a box holding the ashes of the dead, at the ruins of the abandoned Kaigani village of Chasina, at the entrance to Cholmondeley Sound, Prince of Wales Island, Alaska.
- Fig. 341. KAIGANI MORTUARY COLUMN, with compartment boarded up. This contains the remains of the dead in a box, and represents a departure from cremation to inhumation, or aerial sepulture, in imitation of the former custom of thus depositing the cremated remains. At Kasa-an, Prince of Wales Island, Alaska.
- Fig. 342. KAIGANI MORTUARY COLUMNS (aerial sepulture), supporting a box containing the body of the dead. At the partially abandoned village of Kaigani, Dall Island, Alaska.
- Fig. 343. Same as Fig. 340, but slightly different in form.
- Fig. 344. HAIDA COMMEMORATIVE COLUMN, with sign-board-like attachment at the top. This is imitation of the style of post shown in Fig. 341, and as such is a survival of, or emblematic of, the former custom of cremation. This style of post is erected in front of the house of the deceased, while the body is deposited at some distance from it. It is erected to commemorate the dead, as explained in Chapter VII.
- Fig. 345. HAIDA COMMEMORATIVE COLUMN, of same type as Fig. 344, but with two columns, in imitation of the type shown in Fig. 342.



HAIDA MORTUARY AND COMMEMORATIVE COLUMNS.

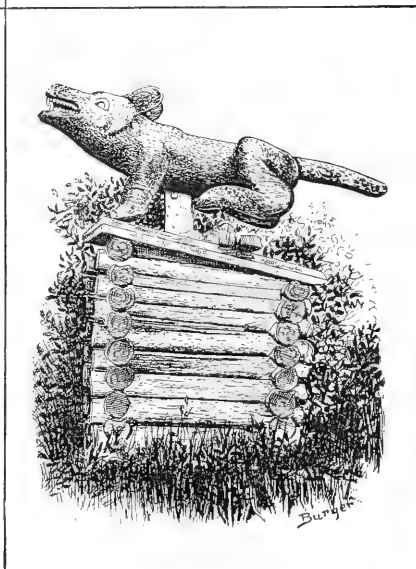
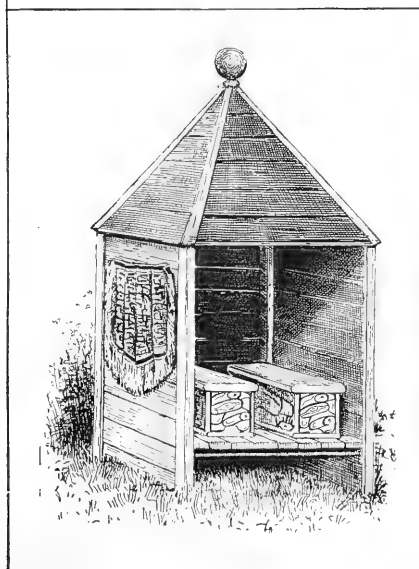
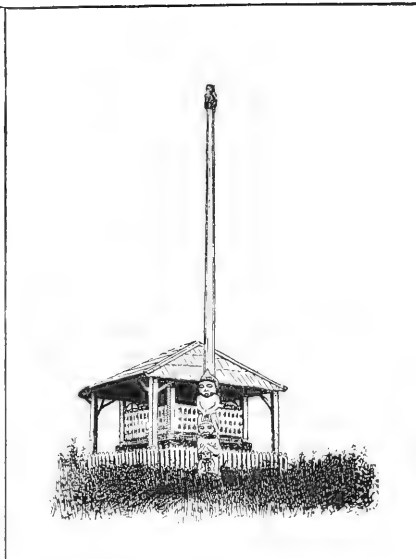
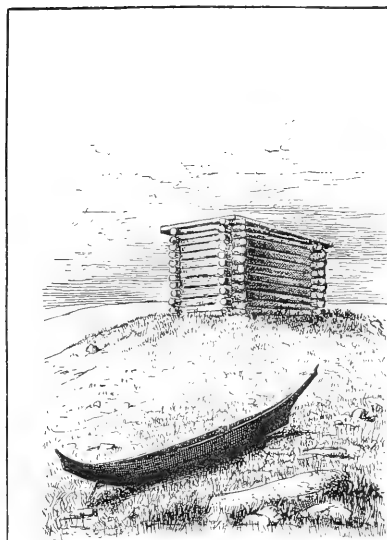
EXPLANATION OF PLATE LXV.



MODERN TLINGIT GRAVES, ALASKA.

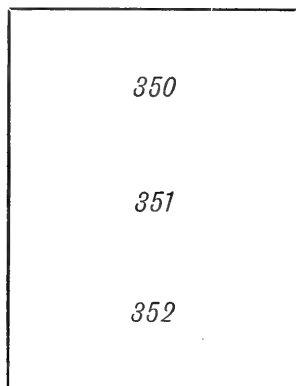
From photographs and sketches by the author.

- Fig. 346. SHAMAN'S GRAVE. Of the general type found amongst the Tlingit.
- Fig. 347. GRAVE OF CHIEF SHUSTOCKS. On Shustocks Point, opposite the village of Wrangell. The pole is surmounted by the carved figure of a black bear.
- Fig. 348. NORTHERN TLINGIT DEAD-HOUSE. Containing the carved and ornamented boxes in which are deposited the cremated ashes of the dead. From a sketch made by the writer, Sitka, Alaska.
- Fig. 349. GRAVE OF INDIAN CHIEF. Surmounted by the carved wooden figure of a wolf, indicating the totem of the deceased. Fort Wrangell, Alaska.



MODERN TLINGIT GRAVES, ALASKA.

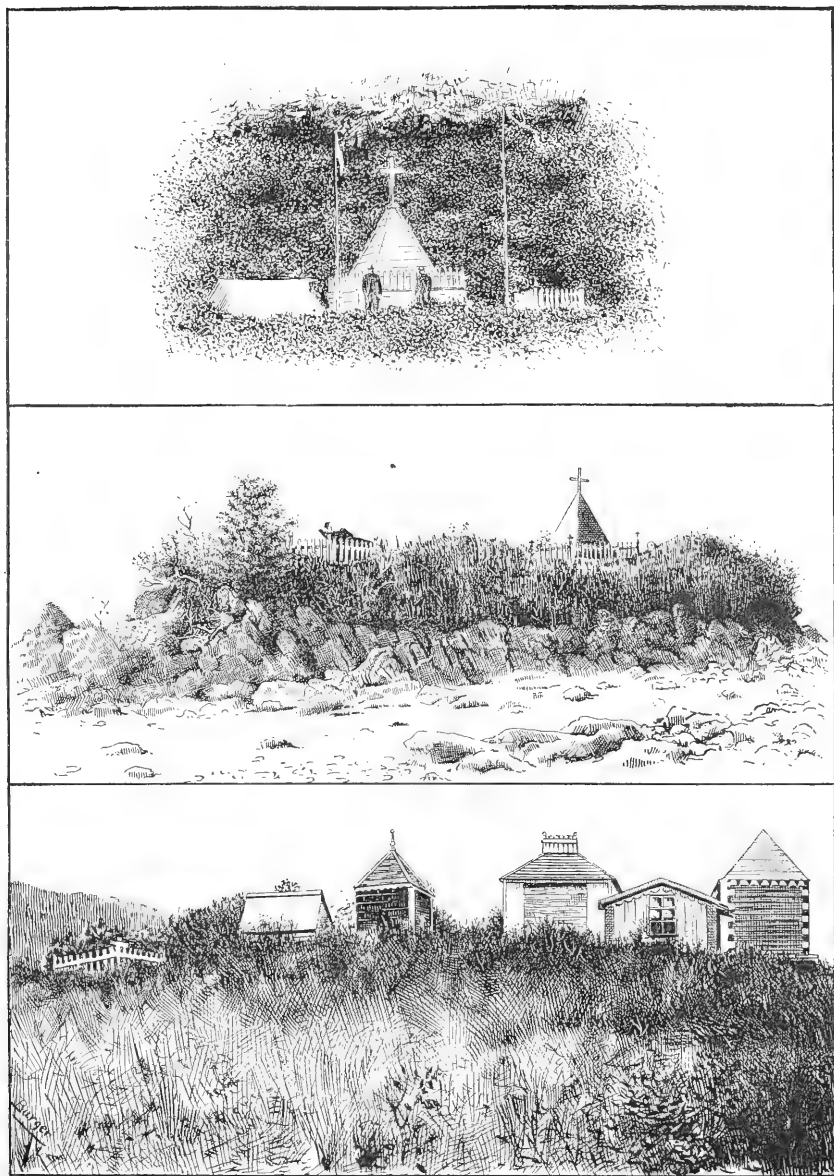
EXPLANATION OF PLATE LXVI.



MODERN TLINGIT GRAVES, ALASKA.

Drawn from photographs in the U. S. National Museum.

- Fig. 350. GROUP OF MODERN TLINGIT GRAVES. Naha Bay. Method of sepulture under missionary influence. The body is inclosed in a casket and buried in the ground. Over it is temporarily erected a cotton sheeting tent, as shown on the left of the view. Later on a wooden monument, surmounted by a cross, is erected, or a picket fence built around the grave site.
- Fig. 351. GROUP OF TLINGIT GRAVES. On a small high-water island off the village of Tongass, Alaska. A curious combination of customs is shown in the left center of the view, where the grave is inclosed by a picket fence, but marked by a carved figure of an eagle, the totem of the deceased.
- Fig. 352. GROUP OF TLINGIT GRAVES and dead-houses at Sitka, Alaska. The graves are of the general type where burial is practiced, but in the dead-houses are deposited the remains of those cremated, as in Fig. 348, Plate LXV.



MODERN TLINGIT GRAVES, ALASKA.

mation, the custom very generally obtained of depositing the ashes in boxes mounted on columns or on shelves or compartments in the columns themselves.

DEPOSITORY OF ASHES.

Vancouver describes a method which he saw at Cross Sound, in 1793, as follows :

Here were erected two pillars, 15 feet high and 4 feet in circumference, painted white; on the top of each was placed a large square box; on examining one of them it was found to contain many ashes and pieces of burnt bones, which were considered to be human. These relics were carefully wrapped up in skins and old mats, and at the base of the pillars was placed an old canoe in which were some paddles.*

Plate LXIV., Figs. 340 and 343, show two types of primitive Haida sepulture of cremated ashes, on the site of the ancient and abandoned Kaigani village of Chasina, at the entrance of the Cholmondeley Sound, Prince of Wales Island, Alaska. The boxes containing the ashes have somewhat fallen into decay, but are seen on the shelves. This is the most primitive form of the sepulture of ashes. Fig. 341 is the sketch of a column at Kasa-an, Prince of Wales Island (Kaigani) in which the shelf and compartment containing the ashes are boarded up. This was generally the custom, and a curious survival of it is shown in Fig. 344, from Masset (Queen Charlotte Islands), in which the boards are simply nailed across the top of the post or column in the semblance of a box, while the body itself is deposited elsewhere in some other form of sepulture. In this we have both a commemorative column and an imitation of the ancient or former method of depositing the ashes, very much as to-day the funeral urn in marble marks with us, in some instances, the site of a grave in which the body is inhumed. The form given to the cross boards is that of an end or one side of a funeral box carved with the totem of the deceased. Fig. 342 of the same plate represents another form of depositing, in which the compartment containing the body of the dead or the boxes of ashes is borne between two plain columns or posts from about 6 to 10 feet apart, there being room for the body or two or more boxes on the shelf. This is also boarded up. The sketch is from one by the writer, made at the village of Kaigani, near Cape Muzon (latitude 54°, 38' N.), the southernmost village of Alaska. There is every reason to believe that at this now almost abandoned village we find the most primitive form in which these depositories existed. Marchand, who visited the Queen Charlotte Islands in 1791, says:

These monuments are of two kinds; the first and most simple are composed only of a wooden column about 10 feet high and 1 foot in diameter, on the summit of which planks are secured, forming a platform. In some this platform is supported by two columns. The corpse, deposited on this platform, is covered with moss and large stones. The graves of the second kind are more elaborate; four posts planted in the ground, and supporting, only 2 feet above the ground, a sarcophagus artistically ornamented and hermetically sealed.†

* Vancouver, Voyage, Vol. III, p. 242.

† Marchand, Voyage, Tome II, pp. 135, 136.

As cremation preceded aerial deposit with the Haida, it is to be presumed that the forms of sepulture illustrated in Figs. 340 to 343 inclusive, from the Kaigani villages, antedate in type those described by Marchand. According to Lisiansky (1805) the same forms as described by the latter were found amongst the Tlingit at Sitka, excepting that the ashes were deposited instead of the corpse:

The bodies here are burned, and the ashes, together with the bones that remain unconsumed, deposited in wooden boxes, which are placed on pillars, that have different figures painted and carved on them, according to the wealth of the deceased. On taking possession of our new settlement [Sitka] we destroyed a hundred at least of these, and I examined many of the boxes.*

Fig. 345 represents a survival of the form of deposit in which the box is supported by two posts from the village of Skidegate, Queen Charlotte Islands, the boards from post to post having the semblance of the end of a huge box, in which the ashes or remains were formerly deposited. This is similar in significance to the one shown in Fig. 344, being a survival of the semblance of a former custom. Wherever cremation was practised in this region, it seems to have been the earlier custom to deposit the ashes in boxes on columns. These latter must however be distinguished from the strictly commemorative columns erected to "glorify the dead." The carved columns, erected at the end of the village, as in Plate III, stand somewhat between the two, having the double purpose of "glorifying the dead" and serving as mortuary columns, to symbolize the old and mark the new form of the interment of the remains. While they do not in themselves serve as a sepulchre or receptacle, they seem in a vague way to have had their origin in the ancient custom of depositing the dead in boxes on or shelves in these carved columns. The origin of the custom of cremation amongst the northern tribes of this region seems traceable to the belief that a piece of the flesh in the possession of an enemy gave him the power to work evil to his spirit and to his kin. This belief in witchcraft is general throughout the coast. Dunn gives a curious illustration of this amongst the Kwakiutl. He says of his dealings with them:

This exasperated the Indians against me; and they gave me the name of *shloapes*, i. e., "stingy;" and when near them, if I should spit, they would run and try to take up the spittle in something; for, according, as they afterwards informed me, they intended to give it to their doctor or magician; and he would charm my life away.†

The bodies of warriors killed in battle were formerly cremated, the head being severed from the body and preserved in a box, supported by two poles over the box holding his ashes. This was the form of sepulchre described by Dixon amongst the Yakutat, as previously quoted in this chapter, the idea of cremation being to prevent an enemy from mutilating the body. It is believed also amongst the Tlingit that the souls or spirits of those whose bodies are cremated will be very comfortable in the spirit world. Whatever may have been the origin

*Lisiansky, Voyage, pp. 240, 241.

†Dunn, Oregon, pp. 246-247.

of cremation, with them it would seem that the reasons for it were not convincing to the larger portion of the southern Tlingit, Haida, and Tsimshian, where sepulture by interment is practised similar to our method of burial.

Amongst the northern Tlingit, where cremation is still practised to a considerable extent, the present form of sepulture is that shown in Fig. 352, Plate LXVI, which represents a group of graves near Sitka similar to the type found in other northern Tlingit villages. They are simply frame houses, with a small window or opening in the side, through which the boxes containing the cremated ashes of the dead are introduced. The funeral boxes containing the ashes of the different members of a family rest side by side on the floor, raised a few feet above the ground, and are generally visible through the window. The form of construction and interior arrangement is illustrated in Fig. 348, Plate LXV. The window is sometimes covered with a Chilkat blanket, as in the illustration, serving to adorn the outside, and to indicate that the remains of persons of wealth repose within. The wooden knob or ball on top is frequently replaced by a carved totemic figure. The dead houses are often painted with totemic designs on the outer walls, and ornamented with scalp locks and other trophies of the deceased.

Cremation is not the universal practice even amongst the northern Tlingit, a large proportion of sepulture being by inhumation. Langsdorff (1805) says that sometimes at Sitka, "The corpse is laid out in a new chest, and interred in a remote part of the forest, commonly between four trees forming a square." Figs. 347 and 349, Plate LXV, illustrate modified forms of sepulture at Fort Wrangell (Stikine) Alaska. The former is the grave of Chief Shustack, on Shustack Point, at the south entrance to Wrangell Anchorage, directly opposite the town. It represents a form of aerial sepulture, in that the remains are not actually buried in the ground, but remain above the surface enclosed in a box. Fig. 349 is that of an Indian chief of the Wolf totem, the form of construction being similar to that of Fig. 346, the grave of a shaman or medicine man.

SHAMAN GRAVES.

These are uniform in type amongst all the Tlingit, and have been the same from time immemorial, as their bodies have never been burned, for the reason that it is a common superstition that fire will not touch them. The bodies are doubled up with the chin near the knees and the upper part covered with a bark or basket-work mat. The graves are of the type shown in Fig. 346, Plate LXV, and are invariably located at some little distance from the village on a small island, conspicuous point, or high promontory, sometimes selected by themselves before death. The sepulchre itself consists of a small pen or enclosure of logs, usually elevated above the ground on four short posts, and facing towards the

water, the roof sloping back in the other direction. The body is borne to the grave in the canoe he used in life; is lowered into the sepulchre through an opening in the roof, and deposited on its side on the floor. With it are placed the talisman, charms, and paraphernalia which served in life to give the power of evil to their possessor. The canoe is hauled up on the beach near the grave with the paddles in it, in preparation for launching, and sometimes placed on rollers or skids.* These graves are usually along some frequented water-course, and are very conspicuous. Whenever an Indian passes one of them in his canoe he drops an offering of some value (usually a piece of tobacco) into the water to propitiate the *yake* of the deceased and bring fair winds and good luck to the superstitious donor.

Amongst the Haida and Tsimshian, the shaman graves are usually small and made of split boards instead of logs, but are substantially the same in form as the Tlingit ones here described. The body is, however, more usually deposited in a sitting posture. The only ones who have the privilege of looking into these graves are the other shaman, who sometimes, under the inspiration of a dream, can go to them and remove certain charms of the deceased for their own use. The ordinary Indian, however, has a most wholesome dread of these graves, and believes that if in passing one he sees any part of the bones protruding through the flesh either himself or some member of his family will soon die.

SLAVES.

The custom with regard to slaves that died a natural death was to throw the bodies into the sea or otherwise cast them aside. Certain slaves, however, were selected by a master to be killed or sacrificed at his funeral ceremonies, in order that their spirits might accompany his in the next world and minister to it as they did to him in life. Those so selected esteemed it a great honor, as their bodies were accorded the same sepulture as their master's. In case of cremation the bodies of the slaves were cremated with that of their master, or in case of interment were buried with it, thus securing to their spirits a comfortable time in the next world. Slaves killed on the occasion of a person of consequence building a house or giving a great feast were accorded also the right of burial of a freeman. There is, therefore, no special form of sepulture for slaves.

CHRISTIAN BURIAL.

Under the religious influence of missionaries the Indians have been led to give up many of their former customs, and inhumation or interment is gradually supplanting all other forms of sepulture. Fig. 350, Plate LXVI, is a characteristic group of modern Tlingit graves at Na-

* This is the case at a grave near Point Nesbitt, Zarembo Island, described for the writer by Lieut. D. W. Coffman, U. S. Navy.

ah Bay (Tlingit), in southern Alaska. The body is enclosed in a rough casket and buried, a temporary tent of white sheeting being erected over the grave. Later this is replaced by either a fence, as shown in Fig. 352, or a pyramidal structure surmounted by a cross, as in Fig. 350, or an eagle or other totemic carving, as in Fig. 351. This fencing in of the grave is now quite generally practised throughout the region of the Tsimshian, Kaigani, and southern Tlingit. Fig. 351 is a group of graves near the village of Tongass (Tlingit). Plate III presents a view in two sections of the grave-yard at the Kaigani village of Kasa-an, Prince of Wales Island, and, with Plates LXV and LXVI, gives a general idea of the graves seen to-day in this region, being sketches, or sketches from photographs, with one exception, taken by the writer in 1885-'87.

IN GENERAL.

As a summary, it may be stated that Christian burial is rapidly supplanting all other forms. Cremation is still in vogue amongst the northern Tlingit, the ashes either being deposited in boxes in a small house, or, according to Dunn, in boxes in a secluded spot in the woods.*

Amongst the other tribes interment is now pretty generally practised, the spot being marked either by a carved column, or by an enclosure in the form of a fence.

MORTUARY CEREMONIES.

Although the methods of sepulture have changed in recent years, the attendant ceremonies have not altered much. On the demise of an important personage in this region, it is customary to array the body in ceremonial apparel and surround it with the tokens of his or her wealth. Thus laid out in state, the relatives and friends of the deceased view the remains. In the case of the death of a great and well-known chief, Indians come from other villages, and the body is thus displayed until in an advanced stage of decomposition, when the final rites take place. Dunn (1835) says of the Tsimshian, "When a chief dies, he is, before interment, dressed up, his face painted, and placed, sitting up, in a canoe, and paddled round the maritime village, looking almost life-like."* Amongst the Haida, Tsimshian, Kaigani, and southern Tlingit, when cremation was practised, the attendant ceremonies were about as follows:

The members of families belonging to the wife's totem, and to totems other than that of the deceased, were invited to a mourning feast, lasting usually four days. The feasting and display of the body in state were accompanied by the dismal lamentations and wailing of the mourners, who, after the guests had entered and were seated, came in dressed in mourning costume and leaning on long staves or carved ceremonial sticks. Arriving in the middle of the floor, they wept, moaned, wailed,

* Dunn (1835), Oregon, p. 280.

and sang in a most dismal manner. In the intervals of mourning the feasting took place, and it was then also that the slaves were sacrificed. The nearest relative or leading man who gave the feast despatched the slaves by a sharp blow on the head with a "slave-killer," a variety of which instruments is shown in Plate XLVI. The most elaborate kinds were carved from deer antlers, but the points were sometimes of copper or stone.

Usually the body of the deceased was borne to the pyre and burned at the beginning or on the first day of the ceremonies, the feasting and mourning following that event. In any case, the bearers of the body are the invited guests. The funeral pile is usually built just back of the house of the deceased. The mourners range themselves around the funeral pyre, their faces painted black, their hair cut short, and sometimes their heads covered with eagle's down. It was the early custom amongst the Tlingit to disjoint the body before burning it. Sometimes the pipe was passed around before the fire was lighted, which last was done at a signal from the master of ceremonies. As the fire was lighted, drums were beaten, and the mourners wailed and cried until the pyre was consumed. The ashes and burnt bones were collected in an elaborately carved wooden box, which was deposited in the mortuary houses, or on the columns described. The relatives washed and repainted their faces, presents were made to the guests who had assisted, and a feast took place, terminating the ceremonies.*

An anonymous writer in the *American Naturalist* thus describes a Tlingit funeral which he witnessed :

In one corner of the room we found the corpse, completely encased in blankets, which in turn were enveloped by a large woven sea-grass mat, and tied up in such a manner as to bring the knees nearly to the chin, and, thus enshrouded, it was placed in a sitting posture. The house was about half filled with Indians—men, women, and children.

On one side of the room a young brave was busily engaged with a pair of scissors in cutting off the long black hair of all the near relatives, male and female. This seems to be one of the usual mourning customs among these Indians. After he had completed this tonsorial duty, during which he had been frequently interrupted by their sudden outbursts of grief, a procession of about twenty Indian warriors, headed by old An-a-hoots, the war chief of the tribe, filed through the small portal. Each carried in his hand a long slender staff made of a hard wood and carved all over with fantastic figures, while bright-colored Hudson Bay blankets fell in not ungraceful folds from their broad, square shoulders. These staves bore evidence of their great age by the high polish which they possessed, as well as by their smoky color and pungent odor. The warriors ranged themselves in line along one side of the house, facing the center, and immediately began a lugubrious death chant, keeping time by raising their staves about three inches from the floor and letting them drop together. This doleful air was much more monotonous than musical.

All this time the relatives of the deceased were rending the air with their lamenta-

* Simpson, *Journey*, Vol. II, p. 208; Dall, *Alaska*, p. 417; Portlock, *Voyage*, p. 290; Frazer, *Totemism*, pp. 81 and 82, quoting Holenberg, p. 324, and Krause, *Die Tlinkit-Indianer*, p. 223.

tions. Every Indian present had his face thickly smeared with a fresh coat of seal oil and black paint, thus rendering himself inconceivably hideous.

At the close of the death song two stalwart young braves mounted to the roof and lowered bark ropes through the aperture, which were made fast to the matting that enveloped the corpse. An-a-hoots made a sign to the young men, and they began raising the body toward the opening in the roof. They always remove their dead from their houses in this manner, instead of through the door, on account of a superstition they have that the spirit of the defunct made its exit in this way. But just as it arrived at the roof one of the ropes broke, precipitating the lifeless bundle upon the fire below, scattering the burning coals in every direction. For a moment all was terror, confusion, and dismay. The shrieks and yells of superstitious horror that went up from the women and children baffle description. The body was hastily snatched from the fire and hurriedly carried out through the door to the funeral pyre, which was about 40 yards in rear of the house.*

The following is a description of an Indian cremation witnessed at Sitka, Alaska, during the winter of 1886-'87, as described for the writer by Lieut. George Barnett, U. S. Marine Corps:

For several days after death the body was lying in state, surrounded by all articles of value which had been the property of the deceased. The face was covered with a mask, and on the head was a handsome head-dress trimmed with ermine skins which hung down the back; the body, which was in a sitting posture, was covered with Chilkat blankets.

During the time the body was lying in state some of the friends of the deceased kept up a doleful chant, keeping time with carved mourning sticks, while others prepared the funeral pile in rear of the house; this pile was made of yellow cedar logs so arranged that a solid mass was formed about 3 feet high and then the sides and one end were continued for about 2 or 3 feet more, thus forming a box open at one end and on top, extra logs being on hand to cover the top and fill the open end after the body was in place.

When all was ready four men took hold of the corners of the blanket, which had been placed on the floor under the corpse, and carried all to the window, resting it on the window-sill, where it was held by four women, while the men went out through the door and again took hold outside of the window; they then carried the body toward the pile, while an old woman, who was left in the house, took a tin pan and gathered up some coals and ashes from the fire in the center of the house; she carried the fire to the window and threw it out after the body, as she said, to purify the house; she then took up a small dog and likewise threw it out of the window to accompany the departed.

Under no circumstances will the Indians take a corpse out through the door; if there is no window, they will make a hole in the side of the house or take it out through the smoke-hole in the roof.

The body was then placed in the hollow part of the pile and the top and end logs put in place, after which all was covered with seal oil and the fire started.

During the burning two men used long poles to stir the fire, so that all would be burned; at the same time about a dozen mourners with their faces blackened kept up a funeral chant, keeping time by beating on the ground with their funeral sticks.

About 30 or 40 feet from the fire a hole had been dug in the ground and partially covered with brush, and here the widow was attended by several female friends, who combed her hair and changed her clothes, as they said, to cleanse her and make her eligible for matrimony again.

After the corpse was consumed the bones and ashes were collected and placed in

Indian boxes, which were deposited in the dead house in rear of the former house of the deceased.

Although large quantities of unburned wood remains after a cremation, the Indians will not use it, but will go miles for their fuel rather than act contrary to custom founded on superstition.

The tribes that now do not practice cremation, such as the Haida, Kaigani, and southern Tlingit, enclose the corpse in a sitting posture in a large covered box, similar to those ordinarily used, and stow it away in the dead house, which is usually a shed or small house behind the lodge of the deceased or at one end of the village. Some of these dead houses contain three or four bodies. After the ceremony of depositing the box, the brother, or other near relative, gives a potlatch and a feast to repay those who have contributed to the ceremony, either in helping construct the box, or the dead house, or in carrying the body. This practice is not very different where the body is interred according to the rites of Christian burial or in imitation of it. The mourning, feasting, and painting of the face is still generally practised with any form of burial, save that directly under the supervision of the missionaries.

It is the present custom, however, amongst the Kaigani, Haida, and southern Tlingit when a chief or very wealthy person dies, to display the body in state for awhile and then enclose it in a casket, which remains in the house in which the deceased lived, the other occupants moving out and finding quarters elsewhere. The casket is surrounded by the boxes containing the ceremonial apparel of the deceased, his household utensils, personal property, and tokens of wealth in general, and thus left for several years, admission being given from time to time to visitors to view the spectacle. Plate LXVII is a view of such a disposition of the body of the famous chief Skowl, at Kasa-an village, Prince of Wales Island, Alaska, from a photograph by the writer. Plate LXVIII, Fig. 353, is a view of chief Shakes lying in state at Fort Wrangell, Alaska.

The grandest feasts and ceremonies in this region are in honor of the dead, and in celebration and commemoration of the prowess, good birth, and wealth of the deceased.

SHAMAN BURIAL.

Dall, speaking of the customs at the death of a shaman, says:

For the first night he remains lying in the corner where he died; but on the following day he is removed to the opposite corner, and this is continued until the body has visited each of the four corners of the house. All the inmates of the house fast meanwhile. On the fifth day the body, dressed in the garb of his profession, is bound to a board. Two ivory or bone wands, which the shaman used in his performances, are placed, the one in the cartilage of the nose, and the other in the hair, which is tied together. The head is covered with a piece of basket-work, and the body is carried to its final resting place.*

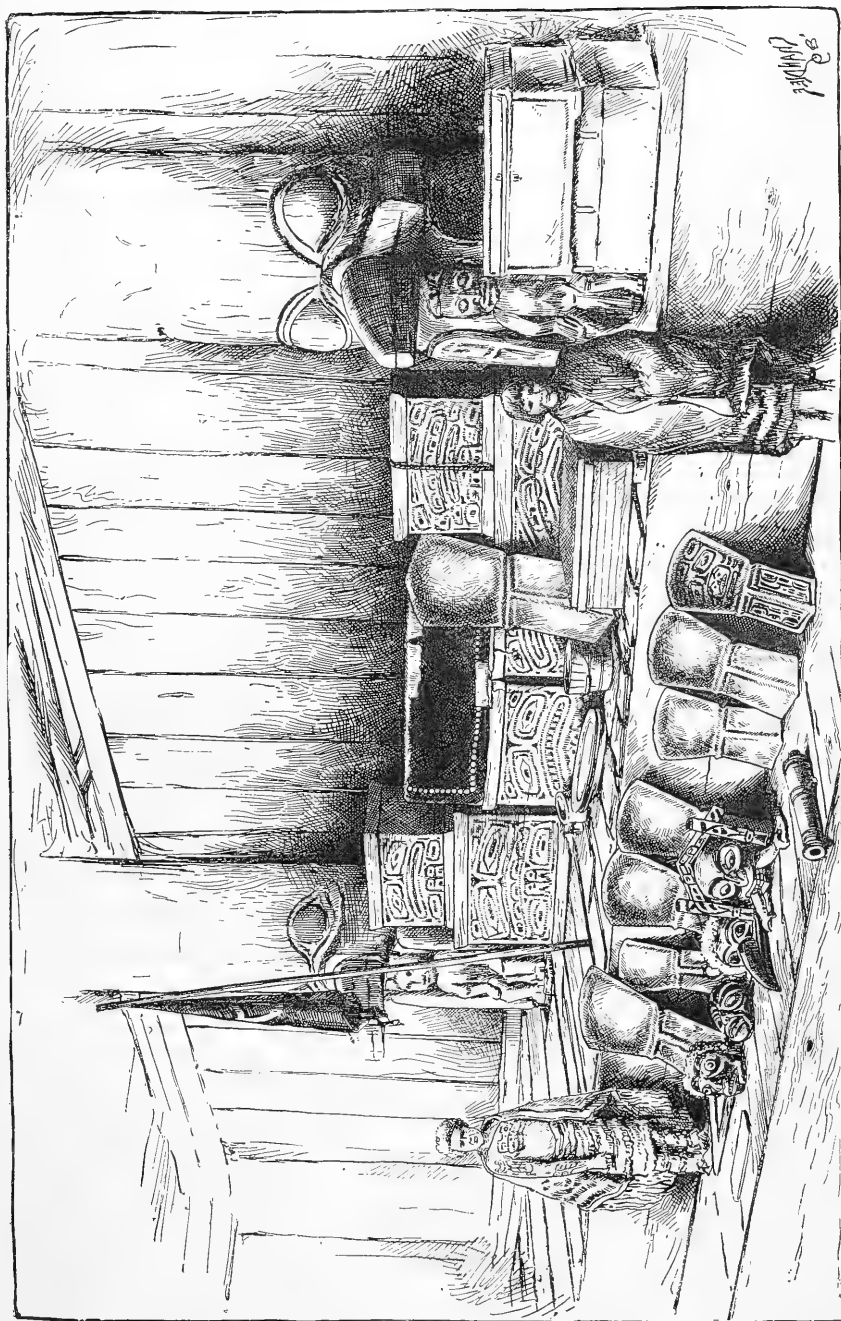
* Dall, Alaska, p. 426.

EXPLANATION OF PLATE LXVII.

MORTUARY DISPLAY OF THE BODY OF CHIEF SKOWL, LYING IN STATE IN HIS HOUSE AT KASA-AN, SURROUNDED BY HIS PERSONAL EFFECTS AND THE TOKENS OF HIS WEALTH.

From a photograph by the author.

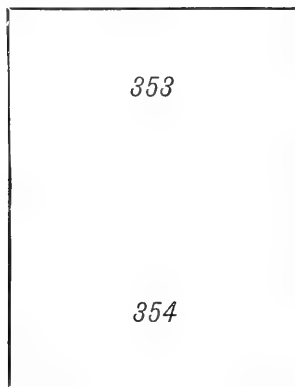
Chief Skowl died in the winter of 1882-'83, and, according to the custom of the region, his body was first displayed in state dressed in the ceremonial robes of a chief. Later it was inclosed in a casket and deposited, as shown, on a pile of boxes containing his clothing and ceremonial dance paraphernalia. The group is at the end of the building, opposite the entrance, between the two carved posts holding the rafters of the house. The piles of boxes, all full of valuables, the row of coppers, the bronze howitzer, etc., all indicate the rank and wealth of the deceased. Just below the casket are grouped his personal household utensils, consisting of porcelain bowls, platters, wooden buckets, spoons, etc., which are cared for as personal relics of the deceased. The figure on the left is that of a former slave of the chief; that on the right a Kaigani in full dance regalia, with painted body and hair bedecked with eagle's down.



MORTUARY DISPLAY OF THE BODY OF CHIEF SKOWL, INCLOSED IN A CASKET AND LYING IN STATE IN HIS HOUSE AT KASA-AN, SURROUNDED BY HIS PERSONAL EFFECTS AND THE TOKENS OF HIS WEALTH.



EXPLANATION OF PLATE LXVIII.



THE BODY OF CHIEF SHAKES LYING IN STATE, AND A SCENE FROM A THEATRICAL ENTERTAINMENT COMMEMORATIVE OF THE LEGEND OF THE ALLIANCE OF SHAKES WITH THE BEAR FAMILY.

From a sketch in the U. S. National Museum and a photograph by the author.

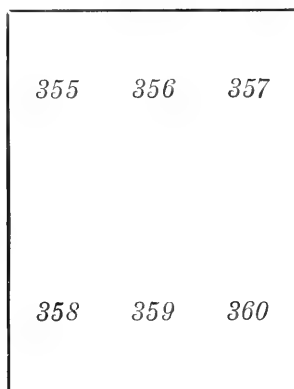
Fig. 353. Tlingit and Haida custom on the death of a chief. The body is dressed in ceremonial attire and surrounded by the emblems of the wealth of the deceased; is displayed in state as long as possible. Indians from far and near gather to view the remains. When decomposition sets in the body is inclosed in a casket and either interred with great pomp or cremated, or else displayed, as in the case of Chief Skowl. This view represents the body of the head chief, Shakes, lying in state at Fort Wrangell, Alaska.

Fig. 354. Tlingit theatrical entertainment, as explained in the text. Chapter XIII, p. 376. 377.



THE BODY OF CHIEF SHAKES LYING IN STATE, AND A SCENE FROM A THEATRICAL ENTERTAINMENT COMMEMORATIVE OF THE LEGEND OF THE ALLIANCE OF SHAKES WITH THE BEAR FAMILY.

EXPLANATION OF PLATE LXIX.



WOODEN COMMEMORATIVE OR MORTUARY COLUMNS OF THE TLINGIT AND HAIDA INDIANS.

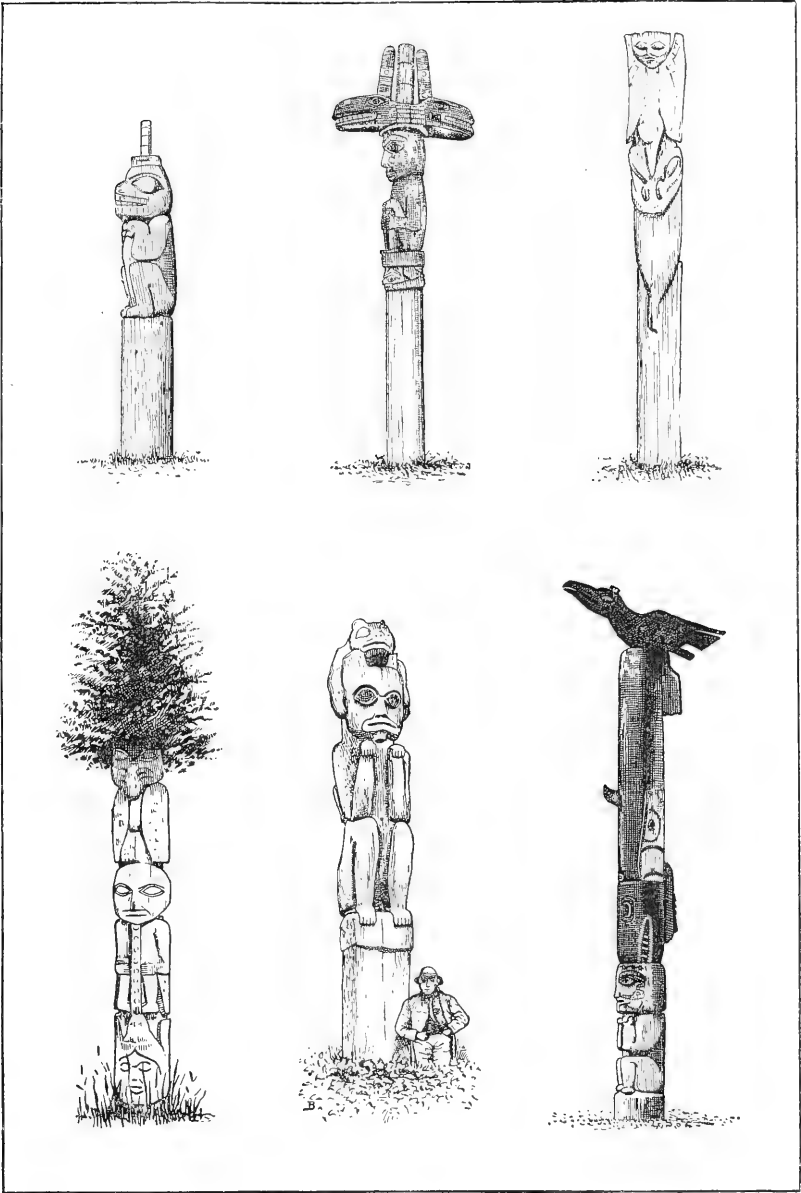
From photographs and sketches.

Fig. 355. MORTUARY OR COMMEMORATIVE COLUMN at Masset, Queen Charlotte Islands, British Columbia.

Fig. 356. MORTUARY OR COMMEMORATIVE COLUMN in front of Chief Shake's house at Fort Wrangell, Alaska.

Figs. 357, 358, and 359. MORTUARY COLUMNS near Howkan, Alaska. Fig. 358, with the spruce tree growing out of the top, illustrates the decay of these wooden carvings through the encroachment of the vegetation, which flourishes wherever it can get the least foothold.

Fig. 360. MORTUARY OR COMMEMORATIVE COLUMN at Fort Tongass, Alaska.



WOODEN COMMEMORATIVE OR MORTUARY COLUMNS OF THE TLINGIT AND HAIDA INDIANS.

SUMMARY.

It is impossible to generalize with regard to the mortuary customs of the Tlingit, Haida, and Tsimshian. The methods of sepulture differ in different localities, and have undergone many changes since the advent of the whites. Around Sitka the custom of burning the dead has obtained from the earliest times, but the sepulture of the ashes has radically changed; whereas, cremation has now been almost entirely given up by the Tsimshian, Haida, and southern Tlingit, having been originally somewhat the prevailing custom. With regard to the burial of shamans the custom seems to have been from the earliest times the same as now, and quite uniform in character throughout the northern region of the coast.

XIII.

FEASTS, DANCES, CEREMONIES, POTLATCHES, THEATRICALS.

I. INITIATORY CEREMONIES: MARRIAGE—CHILD-BIRTH—NAMING—PIERCING THE EARS AND NOSE—TATTOOING—PUBERTY—BRINGING OUT—SELF-NAMING—CHIEFTAINCY—GLORIFICATION OF THE DEAD.

II. FESTIVE CEREMONIES: WELCOME—TRADE—HOUSE-BUILDING—POTLATCHES—CEREMONIAL DANCES—"CULTUS" DANCES—THEATRICALS.

Festivities in general in this region consist in singing, dancing, feasting, and in the distribution of presents; in the parade of ceremonial paraphernalia, and in elaborate ceremonies, accompanied by all the pomp and display that native wealth, ingenuity, and resource can add to make them effective. Invitations to attend are sometimes extended only to the people of certain totems in the settlement; sometimes the whole village is invited; often all from distant tribes are summoned. The host invites according to the significance of the entertainment, or to his resources and abilities to bear the expense. People of small means do not as a rule go outside of their own village, while a chief, from his wealth and the dignity due his position, extends his summons to the people of distant villages. Long before the occasion messengers are sent out to notify the guests, the invitation being general, to men, women, and children. Some of the ceremonies are initiatory in their nature, celebrating the advance of children towards manhood or womanhood; some mark the endeavor of men to attain respect and consideration by the display of wealth, by the giving of presents, and by lavish entertainment; while others are obligatory on aspirants for rank or authority. Running through it all are the regard for wealth and show; the petty envies, jealousies, and rivalries of ambitious individuals and families; the tricks, fictions, and debasements to attain ends; the love of applause, power, and advancement; and, above all, a nicety in the gradation of presents to correspond with the abilities of the recipients to return in kind. This marks a great step in the evolution of the sentiment of gratitude, which is purely a product or attribute of civilization. In fact, in this curious social organization, based on wealth and family, we recognize so many touches of nature, that our kinship with them is too apparent to admit of our judging

them harshly. Time and whitewash have accomplished wonders for us, but the coating is too thin in places to entirely conceal our savage selves of yesterday.

On all festive occasions, which are numerous, singing and dancing are indulged in, the social proclivities being strong within them. The dancing usually takes place indoors, and is accompanied by the singing of a selected few, who sit apart and beat on a drum similar to that shown in Fig. 302, Plate LVII, the time being still further emphasized by the leader or others, who carry rattles or thump on the floor or ground with batons similar to those shown in Plate XVII.

Dancing.—Some of the dances are stately, dignified, and formal; some are wild, passionate, and furious; others are ludicrous; but in general the method of dancing them is the same, the movements simply being slow or exaggerated, as the case may be. It consists mainly in contortion of the body and hips, with the feet firmly planted and the knees slightly bent. The body is wiggled and swayed from side to side or forward and backward, the legs remaining bent at about the same angle. The dancers advance or change about, by a spasmodic hop or shuffling of the feet, but the movements of the feet play only a small part in the so-called dancing itself. Now and then, with the introduction of a new figure or movement by the leader, or the interjection of a witty remark by one of the dancers, the audience will laugh or express its approval by grunts and cries. As the dance proceeds the movements gradually become more and more animated. The leader now and then addresses remarks and ejaculations to the singers and to the other dancers, and the din and contortions are redoubled in fury. Suddenly the music stops and the dancers rest. The costumes worn are various, depending upon the significance of the dance; head dresses of cedar bark, and the tall chief's head dresses (Fig. 35) filled to the top with birds' down; Chilcat and cedar blankets; masks of various kinds and devices; cedar-bark girdles; ceremonial coats and leggings; rattles and whistles; dance wands and mechanically working snappers; wooden helmets; ceremonial bows and arrows; wooden spears and batons of rank; to all this add the painted faces and bodies, the eagle's down on the heads and over the paint, and the clouds of birds' down blown from tubes and scattered by the dancers, and one has an outline of these picturesque and interesting gatherings. Some members of the tribe become famous as dancers and as wits. Their antics and contortions are always watched with interest, and their sallies greeted with laughter by the women and children. This individual may be a woman or man, or formerly might have been a favorite slave, who posed as a clown or fool to amuse the multitude, and who was granted many privileges not given to other slaves. Amongst the Tlingit the men do most of the dancing, whereas amongst the Haida and Tsimshians both sexes participate alike, sometimes one or the other, or both, taking part.

Dawson, in a recent magazine article, thus describes a dance which he saw at Skidegate, Queen Charlotte Islands :

The performers, about twenty in number, were dressed according to no uniform plan. * * * Some had rattles, and added to the din by shaking these furiously at the accentuated parts of the song. Five women took part in the dance, standing in front in a row, and were dressed with some uniformity, several having the peculiarly valuable cedar bark or goat's wool shawls made by the Tsimshians. The head dresses of the women were all alike, consisting in each case of a small mask or semblance of a face carved neatly in wood and inlaid with pearly haliotis shell. * * * The drum was beaten very regularly with double knocks—thus, *tum tum, tum tum, tum tum*—and with the sound the dancers kept time in a sort of chant or song to which words are set, and which swells into a full chorus or dies away according to the notions of a leader, who stood among the dancers, who, besides marking time, now and then gave a few words of direction or exhortation. * * * To the drumming and singing the dancing also keeps time, following it very closely. At every beat a spasmodic twitch passes through the crowd of dancers, who scarcely lift their feet from the floor, but move by double jerks, shuffling the feet a little at the same time. After the performance has continued for ten minutes or so the master of the ceremonies gives a sign and all stop with a loud *hugh!* The dance is resumed by the perspiring crowd at the signal of the drum, which strikes up after a few moments' rest has been allowed.

Langsdorff (1805) thus describes a dance which he saw at Sitka :

The dance itself consists chiefly in a very eager spring, in executing which the dancers scarcely remove at all from one spot. They are all barefooted, and wear a single garment only, commonly the woolen carter's frock mentioned above. One of the dancers seems, as it were, to lead the rest, carrying in his hand a thick sort of a staff ornamented with the teeth of sea-otters; with this he strikes upon the ground to mark the measure. All, without exception, hold in their hands either the tail or wing of the white-headed eagle or a piece of ermine. The latter is valued by them very highly as an article of luxury. They not only ornament their heads with it, and hold it in their hands, but sew it about their garments. The women sit upon the ground at the distance of some paces from the dancers, and sing a not inharmonious melody, which supplies the place of music.*

This description of a dance answers very much to one seen by the writer at Fort Wrangell, in September, 1887, called the "stick" dance, in imitation of the Tinne Indians of the interior, up the Stikine River. It consisted in raising the feet alternately in quick succession as high as possible, without moving the body, to the sound of a drum, chorus, and rattle. It differs radically from the usual coast Indian dancing. From the details given by Langsdorff it would appear that the carrying of white plumes indicates that the ceremonials which he witnessed were those of welcome and friendship or peace, as they took place after strained relations between the Russians and Indians. In the "stick" dance, witnessed at Wrangell, the Indians wore the buckskin costume of the Tinne, and it was given only for the amusement of the guests. As a summary it may be stated that amongst the Tsimshian, Haida, and Tlingit the form of most dancing ceremonies is as follows:

The guests sit around on the elevated ledges on the sides, as does also the chorus, which latter keeps time to the beating of a drum or

* Langsdorff, *Voyages*, Part II, p. 114.

tambourine. There is a master of the ceremonies, who leads off the chorus, and who may himself participate in the dance. The song is usually in praise of the strength, riches, and prowess of the host, and to this the dancers keep time with rattles, grunts, contortions of the body, and shuffling of the feet, or spasmodic hopping, with knees constantly bent. Dancing is an invariable accompaniment of potlatch ceremonies, but may take place without the distribution of gifts.

The potlatch.—This is one of the most wide-spread and curious customs on the northwest coast. It has its origin not only in the custom of the exchange of gifts, but in securing the good-will of others by presents. To procure a wife; to enter the ranks or obtain the influence of medicine men; to become a great chief; to give social standing to one's children; to take on oneself the name of a paternal ancestor; to build a house; to become a respected member of the community; to atone for a wrong done; to resent an insult—property in some form or other must be sacrificed either by destroying it, to show one's rage, grief, or disregard of wealth, or by giving it away to obtain the good-will of others. The accumulation of property is a necessity in these Indian communities in order to stand well in them, and wealth becomes primarily the basis of social organization. Under the head of wealth the general question of property has been discussed. In a potlatch all kinds of personal and household property—blankets, dishes, bowls, canoes, guns, ammunition, money, mirrors, knives, garments, spears, furs, robes, pots, kettles, spoons, etc.—are given away. Discrimination must, however, be made between a reward for services rendered, damages mulcted, or the dot paid to the wife's parents, and the ceremonial distribution of gifts, which last is the potlatch proper. The custom is a very widely-spread one, and is practised by some tribes of the interior, even east of the Rocky Mountains, particularly amongst those of the Dakotan stock.

Amongst the Tlingit, Haida, and Tsimshian the potlatch is a perfectly systematized distribution, involving much more thoughtful consideration and balancing of obligations than the giving of a select german or limited entertainment by a well-recognized leader of society in any of our large cities. The occasions on which they are given will be enumerated later on in the description of the different ceremonies. In general, the more frequently and liberally an Indian distributes property the better his standing with the others, the greater his chances of reaching the dignity of chief in his village, and the more is due him when some other member performs the same ceremony. An ordinary man confines his potlatch to those of his own village, while a chief usually sends out to certain individuals of distant villages by name. Often a chief is assisted by his people, whom, in this case, he invites to a feast, and from whom afterwards he receives gifts which, with those of his own, are given away subsequently at the grand potlatch. Whenever it is the intention of an individual, other than the head chief,

to make such a distribution, he calls together his friends and relatives, makes an inventory of his property, and, with their help, makes out a list of persons to whom he intends giving presents and what articles go to each. It is often the custom, however, previous to calling together the friends, for the host to quietly distribute his property among his friends and the principal people of the village, who by etiquette are required just before the time set for the potlatch to return the presents with interest or increase—that is, for four blankets to return six, or in some such ratio. In this way all the tribe immediately concerned know what they are to get, and the immediate friends and relatives know what the visitors are to receive. The inventory being made out and the council of advisers assembled, the list is read out name by name. As soon as a name is read, the friends present express their approval or disapproval of the intention to give the individual named such and such present. The list being finally made out, the messengers are sent out to announce the date and to invite the guests. On the assembling of the guests, on the date fixed, feasting and dancing are indulged in. If the occasion is for the purpose of raising a house, cutting out and erecting a new carved column, or undertaking some industrial enterprise requiring the combined effort of many, the feasting and dancing alternate with the work, gambling being indulged in during spare times, and the distribution takes place when the work in hand is finished, after which all disperse. In this case, however, the gifts are in the nature somewhat of reward for services, and go to the guests pure and simple, the relatives receiving none; but in case of a grand potlatch, unconnected with the industrial idea, all receive presents according to the list made out. In any case, however, the distribution is the final ceremony, and is conducted as follows: The guests all being assembled, the goods are displayed about the walls and on poles and cords or piled up on the floor in a great mound. The host stands or sits arrayed in ceremonial attire, and presides over the affair with the ceremonial baton in his hand. The herald blows a call similar to that shown in Fig. 334, announces the opening of the ceremony in a speech, extolling the liberality and prowess of the host, and calls a name, giving the present he is to receive. An attendant takes the present and deposits it in front of the person who is to receive it, where it remains until all are thus honored, the names being called out one by one. On the announcement of each name, the host solemnly nods his head and thumps on the floor with his baton. The whole ceremony forcibly reminds one, in a general way, of a Sunday-school Christmas-tree distribution. Formerly slaves were given away to the rich and powerful visitors, but to the poorer guests worn-out blankets, or even pieces or strips of blankets were and still are given, on the principle that to those who have shall be given. A song is sung, a dance performed, and the guests disperse, but frequently a repetition of the whole affair occurs in the next lodge, and so on until the whole

community has contributed to make the affair one long to be remembered, and handed down by tradition as an epoch in the history of the village.

Feasts.—So far we have considered in general dancing, singing, and the distribution of presents. In preparation for a feast the northern Indians (Tsimshian, Haida, and Tlingit), if not now at least formerly, washed off all the old paint, and, after smearing their bodies with fresh grease, repainted their faces, chests, and arms red, etching on their totemic designs, and sprinkling it all with white down in a full-dress but polite coating of tar and feathers. The feasts consist of all kinds of food, quantity being the chief requisite. This, however, is served on large feast dishes and eaten with ceremonial spoons, both of which have been illustrated in the accompanying plates. The guests sit around on the ledges or surrounding platforms, and all eat out of the dishes nearest at hand. The feasts are usually kept up as long as there is anything to eat.

I.—INITIATORY CEREMONIES.

In this class are included all the ceremonies that mark the different steps in life from birth to death. Funeral ceremonies have been described. The most important voluntary step in life, and one that has the greatest significance in our higher civilization at least, is matrimony.

Marriage.—As a rule the Indians marry young. Polygamy is the natural result of the custom by which a sister's son or a brother falls heir to the relict of the uncle or brother, in addition to his own wife. While the custom is now dying out, yet it is in the relations of the sexes that the Indians most tenaciously cling to old-time customs. Polygamy is rare, but the number of wives is regulated purely by the ability or desire of the husband to maintain them. Dunn (1834) mentions a Sebassa (Tsimshian) chief who had twenty wives and hosts of slaves.* The first wife has precedence. It is not uncommon amongst the Tlingit for "rich and substantial men to have two wives, an old and a young one."† Sometimes there is a great deal of sentiment in the selection of a bride; sometimes a match is arranged or schemed for by the families; but more often it is a commercial transaction of buying and selling. A man desiring to marry a girl sends his mother or a middle man to her parents to negotiate. An understanding having been arrived at, he sends as many presents as he can get together to her father. The ceremony is about the same throughout the northern region, consisting mainly in the assembling of friends, the exchange of presents, feasting, and dancing. The father invites all the daughter's relations to the ceremony. On the day appointed the man invites his friends to accompany him, and going to the house of the bride-elect

* Dunn, Oregon, p. 274.

† Langsdorff, Voyages, Part II, p. 133.

they enter and sit down at one end of the room, the girl and her relatives being at the other. The young man's friends make a speech in his favor, and the girl's relatives sing a song, after which the bride goes over and sits down beside her to-be-husband and takes his hand. Dall thus describes the further custom amongst the Tlingit:

All the guests dance and sing; when tired, diversifying the entertainment by eating. The pair do not join in any of the ceremonies. That their future life may be happy they fast for two days. Then taking a little food to sustain life, they fast for two days more. Four weeks afterwards they come together and are then recognized as man and wife.*

When the ceremony is complete the father of the girl gives her a dowry equal in value to that received from the husband, and she goes to live with her father-in-law. If they afterwards separate through dissatisfaction the presents are all returned; but if a wife is unfaithful, the husband can send her back with nothing and get his own property from the father. In any case the children go with the mother. The husband may claim indemnity from his wife's seducer. When the marriage festival is all over, the fact is marked by the removal from the bride's lower lip of the button or pin, and the substitution of the plug or labret.

Child-birth.—It appears that only amongst the Tlingit are peculiar customs in vogue in the treatment of women at child-birth. Petroff says in his report:

The special suffering imposed upon all womankind by nature is increased here a hundred fold by ancient custom and superstition. At the time of child-birth, when women more than at any other time are in need of assistance, the Tlingit females are driven out of the house and left to their fate, shunned by everybody as unclean. The child is born in the open air, no matter at what season, and only some time after the birth is the mother allowed to enter a rude shed erected for the purpose, where she is confined for ten days. * * * A new-born child is not allowed to taste its natural food until it has vomited, and if this does not occur naturally its little stomach is pressed and squeezed until the desired effect is secured. At the age of a few weeks the babe is wrapped in furs and strapped upon a board, and is always carried about by the mother. The infants are given the breast from ten to thirty months, but they are accustomed to other food after they are a year old. The first strong nourishment given them is generally the raw blubber of marine animals, except that of the whale. As soon as the child begins to walk it is bathed daily in the sea, without regard to the season, which accounts to some extent for the robustness of the body of the Tlingit after he has once passed the tender age.†

This custom relating to women at child-birth is much less rigorously carried out now than formerly, and diligent inquiry by the writer has failed to discover that such practice was ever in vogue amongst the Haida or Tsimshian. The cradle-board has been very generally abandoned in this whole region, the child being slung in a blanket or carried in the arms, as with us. When used formerly the board was padded with moss, which was renewed daily. Children are treated with great kindness and leniency and rarely chastised.

* Dall, Alaska, p. 416.

† Petroff, Report, p. 169.

Naming.—Children are given more than one name, but the custom varies somewhat in different localities. The first is applied soon after birth by the mother, and is usually that of a maternal ancestor or near male relative of the mother. Ancestral names are preserved with the greatest care, this being favored by the custom of erecting mortuary columns and preserving traditions of the prowess of ancestors. The first name is conferred without any ceremony. An exception to this has been noted in the adoption of a son as an heir by a wealthy chief, where his sister takes the child and figuratively adopts it, the name of a paternal (or adopted maternal, which is the same) ancestor is applied to the child. The chief makes her a present, and when the boy grows up it becomes his duty to also suitably remember or reward her. Where parents are too poor to prepare feasts for their children they retain their first name; but with families of wealth there are several ceremonies which must be complied with to insure social standing to their children. The first ceremony is a very expensive one, involving in former times for the parents an enormous outlay.

Piercing the nose and ears.—This most important ceremony is intended to give social standing to the children, and involves, or formerly involved (for the practice has almost gone out of date), the following details: (1) A house-building "bee"; (2) a potlatch; (3) the bestowal of a second name on the child or children; (4) the freeing of slaves, and (5) the piercing of the nose and ears, although not in the exact order named. A new house is first built for its express celebration, feasts being given during the progress, and dancing, singing, and gambling being indulged in. The relatives and guests being all assembled, the final ceremonies take place as follows: (During the period when slaves were held a number of them equal to that of the children for whom the celebration was given at this point received their liberty.) The children are brought forward according to their age, and the incisions made in the septum of the nose and the lobe of the ear with a sharp instrument or awl of copper, bone, shell, or iron. A second name is bestowed on each, which amongst the Haida is (according to Dawson) for male children determined as follows:

With the Haidas a first-born son may be called by the name of the mother's eldest brother; the second born after the mother's second brother, or by one of the additional names of the first. Should the mother have no brother the name of some dead friend is chosen, or in cases where the medicine man reveals the return of some one formerly dead in the new-born child, the name of the person supposed to be thus returning to the tribe takes precedence of all others. A chief's son is named by its mother after consultation with a medicine man, whom she pays. He takes a night to think, and mayhaps dream, about it. Thereafter he gives the name of a deceased male relative on the mother's side, which is adopted. The ceremony of naming is witnessed by many, and presents are given. * * * Four times in all a youth changes his name, always taking one from his mother's family.*

After the naming a feast takes place, followed by singing, dancing, and a grand potlatch, when all disperse and the festival comes to an

* Dawson, Report, p. 131.

end. At the potlatch it may be well to mention, all the assembled people, both relatives and guests, receive presents, which is different from a simple house-building or other industrial "bee," where only the guests are rewarded.

Tattooing.—Amongst the Tlingit and Tsimshian, where tattooing is not practiced, the child receives simply the birth name, the second name as in the preceding, and either one or two other names later on, as hereafter explained. With the Haida, however, the ceremony of tattooing, which occupies three separate occasions or gatherings, a name is each time bestowed or assumed. According to Dawson* a house-building bee and potlatch is given by the parents on the first two occasions of the tattooing of a child or several children, and on the last occasion the young man, aided by his mother's people, makes the potlatch from his own house and adopts formally the name of a maternal relative or ancestor. On this occasion the tattooing is finished; but the ceremony will be spoken of under the head of *Last naming*. The process of tattooing has been described.

Puberty.—The ordeals through which a young girl was required to pass on attaining the age of puberty were formerly very severe, but in recent years have been almost entirely relaxed. Amongst the Tlingit they were peculiarly trying, but the custom varied in different localities. According* to Langsdorff, who was amongst them in 1804-'05, it was not "uncommon when a young girl is grown up to shut her up, even for a whole year, in a small house by herself at a distance from her family and acquaintance, where she is kept constantly employed; the idea is that by this means she acquires habits of industry and diligence, reserve and modesty, which will afford the better chance of her becoming a good wife, and lay a solid foundation for wedded happiness."† This exclusion, however, had a deeper reason, in that young girls were at this period considered unclean, and both among the Haida and Tlingit were compelled to wear a peculiar cloak, hood, or hat as a badge of seclusion, and to protect the sky from pollution. The face was painted with charred fungus, and the girl required to fast more or less, only her mother or a female slave being allowed to carry her food. Amongst the Tlingit she was confined to a small hut for six months or so, but amongst the Haida it was customary to screen off a corner of the house and give her a separate fire and a separate exit out of a small back door cut for the purpose. According to Dawson, if it was necessary for her to pass out by the front door, preparations were made by removing everything with which there might be danger of her coming in contact. In meeting men she was required to avert her face and cover it with a corner of her blanket. The hood or cloak she wore was made of woven cedar-bark, nearly conical in shape, and reached down below the breast, though open before the face.

* Dawson, Report, p. 131.

† Langsdorff, Voyages, Part II, p. 133.

These or other similar customs were also in vogue among the Tsimshians, whose practices so closely resemble the Haida's in most respects. Among these people great care was taken to teach the girls submission, contentment, and industry. At certain times they were not allowed to lie down to sleep, but if overcome with drowsiness must prop themselves in a sitting posture between boxes. Before drinking the cup must be turned round four times in the direction of movement of the sun. It was also usual for the mother to save all hairs combed out of the girl, and twist them into cords, which were then tightly tied round the waist and ankles, and left there till they fell to pieces of themselves. This was supposed to give a fine shape to the body. In eating, the girl must always sit down to prevent a too great corpulence. If orphaned, the various ceremonies must be again performed by the girl, even though already attended to.*

If the parents were rich or important people, on releasing the girl a great feast was given by the relatives in her honor by way of bringing her out or making her *début*.

Bringing out.—On the occasion of the feast or ceremony celebrating the release of a girl from her seclusion, she was richly dressed (formerly in sea-otter skins) and the garments worn during her restriction burned up or otherwise destroyed. As a rule this ceremony was accompanied with more or less theatrical effect, in that the girl was seated on a divan surrounded by borrowed wealth, and a curtain arranged to be removed at a given signal. Dawson says:

Among the Tsimshian peculiar ceremonies exist in connection with the "bringing out" of young women, and it is the occasion of public feasting. In case of a young woman, the people being all collected, a curtain is raised, and she is seen sitting with her back to the spectators, peculiarly dressed, and surrounded by a circle of upright "coppers," if enough can be mustered. She then begins to sing, or if she does not, an old woman begins to sing near her, and she becoming encouraged joins. The old woman then gradually drops her voice till the novice is singing alone. She then eventually makes a dance before all the people. The songs and dances are practised before the time for the rite arrives. Similar customs probably exist among the Haidas, though I did not learn any detail concerning them.†

A girl being thus launched forth into the social life of the community became eligible for marriage. In the general idea we see the beginnings of similar customs with which we are familiar in our own more complex social organization.

Self-naming.—Among the Tlingit and Tsimshian a child receives (1) a birth name, (2) an ancestral name, (3) one other name as here explained, and (4) possibly a name late in life when a chief has a son who becomes distinguished, and a name is bestowed on the former implying that he is the father of this distinguished son. Among the Haida two names are bestowed other than the first and second as above, one each on two occasions when a youth undergoes the preliminary tattooing. On the third and final tattooing the youth himself assumes a fifth name after due ceremonies.

It is of this self-assumed name, the third amongst the Tlingit and Tsimshian and fifth amongst the Haida, that we shall here speak. As

* Dawson, Report, p. 130, B.

† *Ibid.*, p. 131.

a youth of good family approaches man's estate it becomes his duty to accumulate all the property possible, and, with the help and material contributions of his mother's people, to make a grand feast and potlatch from his own house. Practically it is simply a house-building "bee," in which the young man erects his carved column and the rafters of his house, takes on himself the name of an ancestor (usually maternal); and becomes a petty chief or man of influence in the village. It is on this occasion that the tattooing of the young Haida is finished and when the aspirant for honors drinks down the oil from the great wooden spoon as shown in Fig 27 and Plate LI. These ceremonies are nowhere accurately described, and the writer gathered but a meagre outline of them at Port Simpson, British Columbia. The significance of the affair is similar to that of the "bringing out" of girls, in that it marks the arrival of the youth at man's estate. At the conclusion of the grand feast and potlatch, the young man is known by his newly adopted name.

Chieftaincy.—Chieftaincy is to a certain extent hereditary, but as it depends upon wealth, any freeman who can accumulate property may, by erecting a house and giving potlatches and feasts in honor of his ancestors, come finally to be the head of a household and be regarded as a petty chief or one of the principal men of the village. Good birth and wealthy and influential family connections are the first requisites of an aspirant for the highest rank. To be a petty chief in the village a man must practically be at the head of a household, hence the necessity for building a house and for marrying. To build a house the united labor of many people is required, hence the house-building "bees." To reward those who participate and to gain the good will of others, feasts must be given and presents distributed; hence the potlatch. To retain the respect and esteem of others these feasts and potlatches must be repeated at intervals. By an alliance with medicine men, whose influence is purchasable, various deceits and tricks may be resorted to in order to impose on the credulity of the vulgar herd and increase the respect they have for the rank and power of the aspirant for honors. In order to strengthen this feeling of respect it is necessary to brush up the coat-of-arms, so to speak, and give a grand feast in honor of some departed ancestor. This is called "glorifying the dead," and may take place a few years after the decease of the relatives or many years afterwards. Finally, by dint of giving feasts, potlatches, and "bees;" by intrigue, display, and prowess; by push, energy, and enterprise, the aspirant finds himself in the front rank of the chiefs, a respected and influential elder in the village.

Glorification of the dead.—In Chapter XII the mortuary customs of the different tribes of this region were discussed. On the death of a chief, or other very important personage, the body, after lying in state for a year or more, is finally interred with great ceremony, or, as amongst the northern Tlingit, burned on a funeral pyre. It then devolves upon

the brother or other relative to whom the estate of the deceased has come down to erect a carved mortuary column in front of his house, and give a grand feast and *pojlatch* to glorify the dead. This is by far the most elaborate and important ceremonial of these Indians. The carved columns are shown in Plate LXIX, and in Figs. 1, 179, 294, 344, and 345, as well as in Plates I and II in the general views of Kasa-an village. These are carved usually by one of the experts of the village, and, although less costly than the large columns, are quite expensive. The time being set for the ceremony, guests are invited from far and near and entertained by the host and his relatives. The monumental column is erected, and at the feast which follows speeches are made extolling the virtues of the departed, but dwelling particularly upon those of the giver of the feast. Although the latter practically squanders his substance in thus entertaining his visitors, he feels well repaid in receiving their expressions of approval and high esteem. Gambling, feasting, and dancing occupy, as in all such gatherings, the leisure time not devoted to the work or entertainment in hand.

Summary.—In these initiatory or commemorative ceremonies we see the gradual identification of the individual with his totem and the celebration of the different steps in the progress of the child from birth to womanhood and manhood and in commemoration after death. The initiatory ceremonies of medicine men and of the four religious orders of the Tsimshian are reserved for a special chapter, which will not appear with this paper, being withheld, with several others, on account of the incompleteness of the data, and the hope on the part of the writer that the task will be undertaken by some organized department of the Government. (See Synopsis of Contents.)

II.—FESTIVE CEREMONIES.

In the exchange of social amenities and in the round of ceremonial gatherings which take place as just described there are many forms of etiquette to be observed. In one sense these are not rigid, but are, however, sufficiently uniform in their character to admit of classification and description.

Welcome.—These Indians welcomed the arrival of the early European navigators and traders by paddling their canoes several times around the ship, making long speeches, scattering bird's down and singing. The significance of bird's down has been alluded to as an emblem of friendship and peace in Chapter IX. Two parties of Indians meeting in canoes exchange civilities very impassively by talking or shouting out. Poole (1867) describes the meeting of two friendly canoe parties which had been separated by stress of weather and each believed the others to have been lost. They danced in a circle together, the two chiefs capering about madly while the air rang with shouts.* The cere-

* Poole, Queen Charlotte Islands, p. 279.

mony of welcome at a village is rendered practically in the assistance which they lend in helping to unload and haul up the canoe of the visitors. Official ceremonies of welcome to guests by a chief consists in the reception of the visitors in state in his house or lodge. To make it impressive he sits cross-legged on the ledge or platform, surrounded by his friends and relatives, who squat about. On the arrival of the guests the chief delivers a long speech, interspersed with sudden outbursts and grunts of approval by his people. After that an exchange of presents takes place and a feast or dance is given in honor of the visitors. When a party of friendly Indians arrive at a village the chief receives them in a dance ceremony performed by himself. Their canoes are hauled up on the beach by the villagers, but the chief does not come down to meet them. He stands near the fire in the back of the house dressed as in Plate IX, with the top of his head-dress filled with swan's down. As the visitors enter, the people sitting about the fire break forth into a song, accompanied by a drum, and the chief makes his *pas seul*, scattering the down, filling the air, and covering the spectators. In the case of an Indian arriving at a strange village, he goes to the house of one of his totem as indicated by its totemic column. The owner comes out to welcome him, and if he likes makes a dance and a feast in honor of his visitors. Guests arriving to take part in some general ceremony are entertained by the relatives of the host and of his wife.

Trade.—The ceremonies attending trading in the early days of the intercourse of the Europeans and Indians have been described in Chapter VIII. They really differed little from the general ceremonies of welcome, but were intended to impress the visitors with a due sense of the rank and importance of the head of the household. The time thus spent by the Indians in dancing, singing, etc., was a source of great annoyance to the traders, who were generally eager to transact their business and seek other villages while the good season lasted.

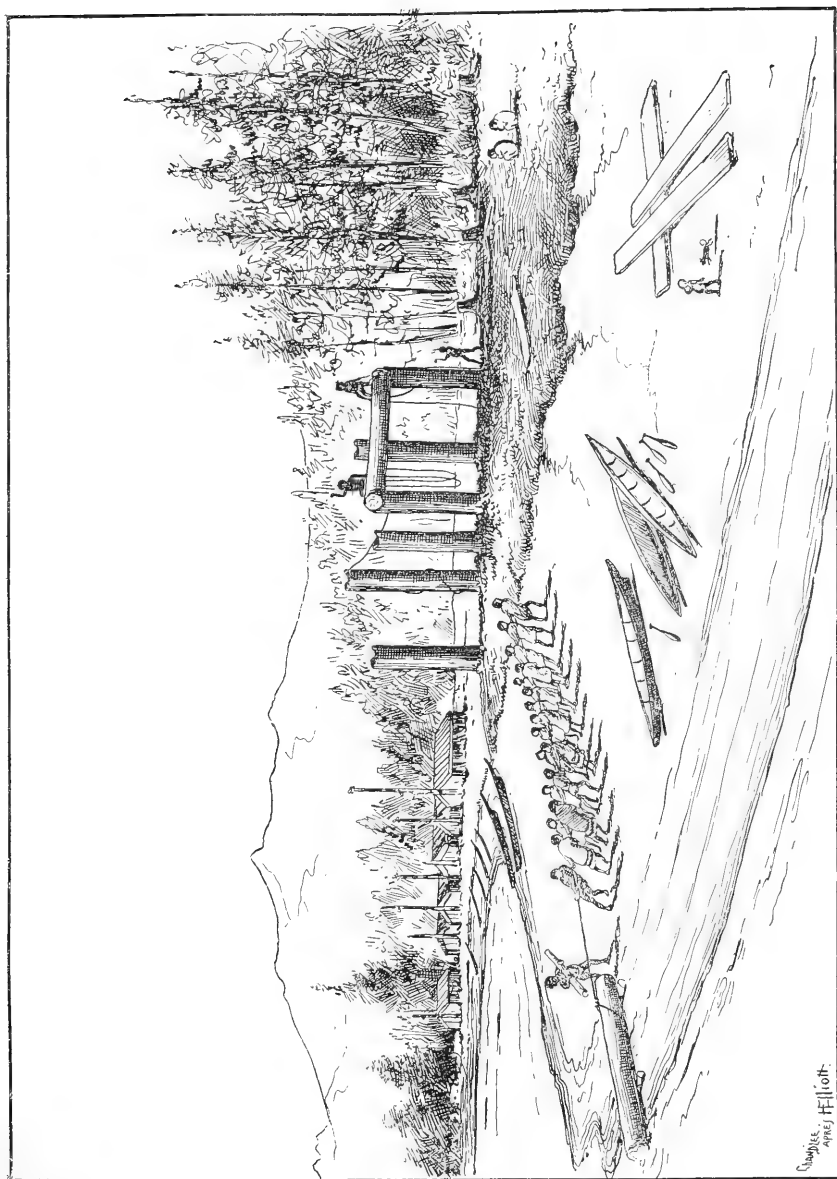
House-building.—In Chapter VI, under the head of "Haida permanent dwellings," the process of erecting a house is described in detail. Through the kindness of Mr. Henry Elliott we have in Plate LXX an excellent sketch, made at Fort Simpson, British Columbia, in October, 1866, illustrating a house-raising by a party of Haida who had secured permission from the Tsimshian Indians to erect it near their village for the accommodation of visiting Haida. This spirited sketch by Mr. Elliott has remained in his portfolio for twenty-two years, and is now published for the first time. The immense size of the beams and planks used necessitates the co-operation of many individuals, and the occasion of their gathering from other villages is made as enjoyable as possible. The great labor and expense involved requires the whole process to extend over a period of several years. The cutting and roughing out of the timbers in the forest, the launching of these and towing to the village, the carving of the totemic column and supports for the

EXPLANATION OF PLATE LXX.

A BAND OF HAIDA ERECTING A HOUSE AT THE TSIMSHIAN VILLAGE OF PORT SIMPSON,
BRITISH COLUMBIA, IN OCTOBER, 1866.

From a sketch by Mr. Henry W. Elliott.

The scene is that of the co-operative building of a house, a band of howling, yelling, half-naked Haida being engaged in hauling up a huge rafter on skids by means of ropes of spruce-root or twisted cedar-bark. The canoes on the beach, and the village in the distance, lend to it the characteristic features of a view in this region.



A BAND OF HAIDA ERECTING A HOUSE AT THE TSMISHIAN VILLAGE OF PORT SIMPSON, BRITISH COLUMBIA, IN OCTOBER, 1866.

huge beams or rafters, and their final erection into the frame work of a house, all require not only the expenditure of much time and labor, but a very extensive outlay of wealth. The gathering is an occasion of much ceremony, but the work in hand, conducted always with dire confusion, shouting, and yelling, occupies but a small portion of the time, the remainder being filled in with gambling, feasting, dancing, speech-making, and dissipations of various kinds. Formerly the custom obtained of killing several slaves when a person of consequence built a house, the victims being selected sometime before the ceremony. The bodies of those slain were accorded the right of burial, and in this much were deemed very fortunate. Petroff says:

If an intended victim managed to escape or to conceal himself he was allowed to live, and might return after the conclusion of the festivities at the house of his master without incurring punishment. It frequently occurred that powerful chiefs assisted favorite slaves on such occasions to make their escape.*

After the house has been finished all these ceremonies take place therein. The dancers paint their faces, and, attired in their best, go through with a dance lasting an hour or so. Amongst the Haida the dancers are the relatives of the host's wife. At its conclusion speeches are made (and formerly the slaves sacrificed) and the potlatch takes place, the host presiding. After that they disperse.

Potlatches.—The potlatch, as entering into other ceremonies, has been described in the first part of this chapter. It is the accompaniment of every gathering designed to elevate the host in the good will of the community and advance him in rank by increasing the respect felt for him in his own and other villages. The potlatch in itself as a separate ceremony is, however, practiced. Invitations to it are sent out as for other gatherings. Usually they are given by chiefs or persons of wealth well-established in the community. According to Dawson,

Each chief with the Tsimshians had also [in former days] his jester, who is sent on errands of invitation, announces the guests on their arrival, and makes jokes and endeavors to amuse the company, though preserving his own gravity. The jester is not, of course, always in attendance. He receives nothing for his trouble, apparently looking on the position as honorable, and inherits nothing on the chief's death.†

The object of the potlatch thus given as a separate ceremony is to strengthen the giver's position in the community and to increase his reputation at home and abroad.

Ceremonial dances.—Sufficient data is not at hand to classify the various dances of the northern Indians of this region. The weight of evidence seems to be that amongst the Haida the Tsimshian language is used in the songs accompanying their dances, and that in all probability most of the religious and winter-dance ceremonials of the Haida were originally borrowed from their Tsimshian neighbors. Little is known on this subject, and it presents a most interesting field for future investigation, particularly in the relation of these to the winter dances of the Kwakiutl and other southern tribes.

* Petroff, Report, p. 172.

† Dawson, Report, B, p. 120.

Cultus dances.—This is a term usually applied to dances carried on without any apparent motive other than amusement in imitation of the actions during the greater festivities, possibly, however, as much for practice as anything else.

Theatricals.—Portlock^{*} (1787) gives an interesting account of the ceremonies of the Tlingit with whom he traded. After an elaborate entertainment of welcome by singing and dancing in the canoes alongside the Indians adjourned ashore, and returning again began their song.

This time, by way of varying our amusement, the chief appeared in different characters during the time his people were singing, and always changed his dress when he varied his character, in doing of which some of his companions held up a large mat, by way of a screen, to prevent us from seeing what was going on behind the curtain. At one time he appeared in the character of a warrior, and seemed to have all the savage ferocity of the Indian conqueror about him. He showed us the manner in which they attacked their enemies, their method of fighting, and their behaviour to the vanquished enemy. He next assumed the character of a woman, and to make his imitation more complete he wore a mask, which represented a woman's face with their usual ornaments; and indeed it so exactly resembled a woman's face that I am pretty certain it was beyond the reach of Indian art, and must certainly have been left by the Spaniards in their last visit to this part of the coast.*

The type of mask referred to is shown in Fig. 56, Plate XVI, and in spite of Portlock's doubts is a veritable product of Indian art.

Dunn says of the Kwakiutl:

In the winter months these, as well as the neighbouring tribes, assemble in great numbers in the chief's house for the purpose of witnessing the chief imitate different spirits, whom they are supposed to worship. He puts on at intervals different dresses and large masks of different kinds, entirely covering his head and neck. The masks are made to open at the mouth and eyes by means of secret springs, invisible to the spectators and different noises are sent forth. He dresses for each character behind a large curtain, drawn quite across the room, like the drop curtain in a theatre, and then comes forth and stands on a sort of stage in front of it, while the spectators are ranged on benches placed along the side walls. In one of the characters he imitates the rising sun, which they believe to be a shining man, wearing a radiated crown, and continually walking round the earth, which is stationary. He wears on this occasion a most splendid dress of ermine and other valuable furs, and a curiously constructed mask, set round with seals' whiskers, and feathers which gradually expand like a fan, and from the top of the mask swan-down is shaken out in great quantities, according as he moves his head. The expanding seals' bristles and feathers represent the sun's rays, and the showers of down, rain and snow; the Indians chanting at the same time in regular order and in a low key showing reverence, devotion, and awe. * * * Sometimes the various divine personages are represented by one man; sometimes there are two or three personators on the stage all at once, representing different divinities.†

In Plate LXVII are shown some of the masks belonging as personal properties to the late Kaigani chief Skowl. In the boxes are the ceremonial vestments worn on occasions. In Plate LXVIII are two views of the paraphernalia belonging to Chief Shakes of Fort Wrangell (Tlingit), the upper one, Fig. 353, representing the body of the late chief lying in state, and the lower, Fig. 354, a theatrical group representing a legend

* Portlock, *Voyage*, p. 283.

† Dunn, *Oregon* (1842), pp. 253, 254.

tracing the descent of Chief Shakes from the bear. Amongst the Tlingit, Haida, and Tsimshian these theatrical entertainments are also given by the chiefs, but have more of a totemic than a religious significance, as in the south. It was formerly and is now somewhat the custom in the more out of the way villages for each chief to have a helper or principal man, who enjoys the confidence of the chief, has considerable authority, gives advice and instruction to the chief's successor, and has the care and keeping of certain secrets and properties belonging to the chief. These last duties pertain largely to assistance rendered in the production of the theatrical representations of the traditions and legends relating to the chief's totem. On such occasions, the guests being assembled, the chief presides, while the principal man directs the entertainment. Fig. 354 represents a scene taken from a representation witnessed by the writer at Chief Shakes's, Fort Wrangell, Alaska. The figure of the bear is a mannikin of a grizzly with a man inside of it. The skin was obtained up the Stikine River, in the mountains of the interior, and has been an heirloom in Shakes's family for several generations. The eyes, lips, ear lining, and paws are of copper, and the jaws are capable of being worked. A curtain screen in one corner being dropped, the singing of a chorus suddenly ceased, and the principal man, dressed as shown, with baton in his hand, narrated in a set speech the story of how an ancestor of Shakes's rescued the bear from drowning in the great flood of years ago, and how ever since there had been an alliance between Shakes's descendants and the bear. This narration, lasting some ten minutes, was interrupted by frequent nods of approval by the bear when appealed to, and by the murmurs and applause of the audience.

In these various representations all sorts of tricks are practised to impose on the credulous and to lend solemnity and reality to the narration of the totemic legends. The masks shown in Plate LXVII are those worn by the different characters in the entertainments offered by Chief Skowl.

XIV.

GENERAL CHARACTER OF TRADITIONS, MYTHS, AND FOLKLORE— BIBLIOGRAPHY.

The traditions and myths of the northern group of the northwest coast (Tlingit, Haida, and Tsimshian) are very similar, but with peculiar local variations. No attempt can be made here other than to outline the principal tradition of the creation and of the origin of man, and that only to illustrate the general character of their beliefs and ideas. In their legends and traditions we have the unconscious expression of their religious, moral, and æsthetic ideas, their views of life and death, their cosmogony and astrology, their fanciful biographies and history, and their explanations of all the phenomena of nature. Related around the log fire in the family circle, with loud and confident voice, with labored and dramatic imitations and gestures, and listened to with wrapt attention by the inmates of the lodge, they represent the history of human thought—the blind gropings of the mind to know—in this narrow pocket of the world, and as such are as worthy of careful compilation and study as if they were facts of veritable history.

The creator of all things and the benefactor of man was the great raven called by the Tlingit *Yetl*, *Yeshl*, or *Yeatl*, and by the Haida *Ne-kil-stlas*. He was not exactly an ordinary bird, but, like all old Indian mythical characters, had many human attributes, and the power of transforming himself into anything in the world. His coat of feathers could be put on or taken off at will like a garment, and he could assume any character whatever. He existed before his birth, never grows old, will never die. Numerous are the stories of his adventures in peopling the world and giving to man the earth, fire, fresh water, life, fish, game, etc. According to the Haida and Kaigani the first people sprung from a cockle-shell (*Cardium corbis*, Mart). *Ne-kil-stlas* became very lonely and began to look about him for a mate, but could find none. At last he took a cockle-shell from the beach, and marrying it, he still continued to brood and think earnestly of his wish for a companion. By and by he heard a faint cry in the shell, which gradually became louder till at last a little female child was seen, which by degrees grew to be a woman and married the raven. From this union came all the Indians of this region, who at first lived in darkness and want. As they multiplied *Yetl* or *Ne-kil-stlas* endowed them with the various gifts of light, fresh water, fire, etc. All these were in the pos-

session of the chief evil spirit, a great chief, the uncle of *Yetl*, who lived on the mainland where the Nass river now is. He was master of the tides and had great power, and the stories of how *Yetl* circumvented him are numerous and interesting. The Haida name for this uncle is *Setlm-ki-jash*, the Tlingit designation being *Kees-du-je-al-ity Kah* or *Keesshusaah Ankow*. He had a wife and sister, or according to some versions a wife and daughter. Of his wife he was very jealous, and whenever for any reason he was away from home, hunting, fishing, or working, he imprisoned her in a box or basket, and tied her up to the rafters in the lodge, setting a number of little red birds to watch her. If by any chance the box were opened the birds would fly to him and warn him. He was also very jealous of the posterity of his sister (or daughter), whose children he killed for fear that when they grew up they would prove rivals to him in his wife's affections.* According to the Haida tradition, he threw her progeny into the fire; according to the Tlingit, he drowned them. This sister (or daughter) was not allowed to eat or drink anything until the chief had examined it, as she had become pregnant from eating certain things many times before. As every part of the house was so jealously guarded, *Yetl* or *Ne kil-stlas* did not know how to get in to steal the various things he wanted for the good of man, but finally he hit upon the plan of being born into the family. One day he saw the sister (or daughter) go to the brook to get a drink, so transforming himself into a drop of water (or spear of cedar or blade of grass), he eluded the vigilance of the chief and was swallowed by the girl, and in due time *Yetl* was born to her as a son.† She concealed the fact of his birth from the chief for some little time. In ten days' time he grew to almost man's size. His mother taught him many things, amongst others the use of the bow and arrow, and he became an expert shot. With his arrow he killed the magical crane whose skin enabled the wearer to fly, and the diver with whose skin he could float. One day the chief discovered *Yetl* and pretended to be pleased with him, but he took him out in a canoe and threw him overboard. *Yetl*, having on his diver's skin, walked along the bottom and met his uncle on shore. Next the chief threw him into the fire and piled logs on him, but having on a magic cloak he came out of the fire unharmed. One day when the chief was away, he opened the box in which his wife was confined and released her, but the little birds flew to him and informed him. The chief returned in a great rage, but *Yetl* sat calmly without noticing him. This was too much for the master of the tides, so he commanded the floods to rise and destroy this impudent meddler, but *Yetl*, giving

* This is on a parallel with the habits and morals of these Indians. We have here, as in all traditions, an expression of the moral ideas of the people.

† It is interesting to note in this connection the widespread belief both among savage and civilized peoples in the possibility of pregnancy through indiscretion in eating.

his mother the skin of the diver to enable her to swim, himself put on the skin of the crane. The salt water rose until it began to come in the door, when the chief put on his tall dance hat which made him amphibious, and *Yetl* flew out through the smoke-hole. As he flew, he began to fire, and was compelled to come back from time to time to rest on the chief's dance hat, which was the only thing visible, till finally he gained strength enough to fly to the sky, which he pierced with his beak and hung to until the tide reached to his wings, when it began to subside. Finally he let go of his hold and, flying for some days, he lit on a bunch of kelp to rest. At this point the story varies so much in different localities that it is difficult to make it at all general. According to the Kaigani *Yetl* descended into the sea and rescued his mother from the lord of the tides; according to the Tlingit a sea-otter carried him ashore from the kelp; according to the Stikine Indians he lit originally on the Queen Charlotte Islands, and picking up pieces of the wood of the Douglas pine in his bill he flew all over the other islands, and wherever he let fall a piece of this wood, the Douglas pine is now found. Fresh water he stole from the lord of the tides by strategy; also the new moon. In the carved column shown in Fig. 179, Plate XXXV, one of the figures represents *Yetl* with the new moon in his bill and the dish of fresh water in his claws, in illustration of this part of the legend. He also stole the sun and the stars from the boxes in which they were imprisoned by the lord of the tides.* When the sun shone forth for the first time all the people were frightened and ran in all directions; some of them into the mountains, some into the woods, and some into the water, and all of these were transformed into animals according to their hiding place. Fire he obtained from an island in the sea. He reached there by the help of his magic bird skin, and seizing a burning brand in his beak he started back, but the journey was so long that nearly all the wood burned up, and even the point of his bill was scorched black and he had to let it drop. The sparks flew over the ground in all directions. From this time both the wood and stone contain fire, which can be obtained from the one by striking it and from the other by rubbing. Endless are the details of the adventures of *Yetl*, not to mention the other traditions and myths which no one Indian can ever learn. Many of them are remembered simply as bearing on or relating to the totem of the individual. In general their belief is in indwelling spirits. The sea, the woods, and the air are peopled with them. All the phenomena of the universe are attributed to their action and most of the rites of these Indians of a religious nature are in the direction of propitiating them. It is not the purpose here to treat of the traditions, myths, and beliefs of the Indians. The subject is worthy of special study and will undoubtedly receive the attention it merits.

* This idea of different valuables being stored in boxes naturally arises from their own time-honored custom of storing things in this way.

The writer appends here a bibliography of the myths, traditions, folklore, and vocabularies of the Indians about Dixon Entrance, southern Alaska and northern British Columbia. It is however very incomplete, and only illustrates the poverty of the literature on these subjects.

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XV.

GENERAL NOTES.

RELATIONS AND AFFINITIES OF THE TLINGIT, HAIDA, TSIMSHIAN, AND KWAKIUTL—THE HAIDA. REMARKS ON THE MAORI OF NEW ZEALAND—THE KAIGANI. ETHNOLOGICAL WORK TO BE DONE.

A thorough study of the ethnical affinities and mutual influences of the various Indian stocks of the northwest coast is out of the question with the data at hand, yet many attempts have been made to isolate the Haida and to give them an origin different from the others. It is held by some that this stock is an offshoot of the Asiatic Mongoloid group, particularly of the Japanese branch, and by others that they are of Aztec origin. The supporter of this latter theory is Mr. J. G. Swan, of Port Townsend, Washington Territory. A comparative study of the languages, customs, habits, and traditions of the different Indian stocks of this region even with the meagre data at hand, would, however, seem to locate the Haida as of near kin to the Tsimshian and Tlingit. Difference in environment would seem to account sufficiently for the physical and linguistic differences. Along with much originality, the inhabitants of the Queen Charlotte Islands have shown so much genius and receptiveness in adapting and adopting the customs of others, that they present some very puzzling affinities with distant stocks, giving color to these various theories as to their origin. In their legends the Haida are at one with the Tlingit, and the totemic organization of the two stocks do not differ very materially, although this needs further study. Their languages are, according to Dr. Franz Boas, very much alike in structure, while their vocabularies show great differences. In their arts the Haida have borrowed so largely from so many sources, that they are considerably in advance of the Tlingit. All things considered, the Tlingit and Haida show evidences of near relationship and of intercourse at a remote period. A consideration of the mutual influences of the Tsimshian stock and the northern Kwakiutl tribes of the Haeltzukan stock will throw much light on the origin of certain customs amongst the Haida, for the last named have been considerably influenced by the Tsimshian. Indeed, the Tsimshian seem to have been the middle men or center of distribution in this region.

The Tlingit present the simplest problem. Confined to the northern end of this region and only slightly influenced by adjacent tribes, their

totemic organization into phratries, totems, and subtotems, their legends and their matriarchal organization, all bear a distinct and original stamp. The Tsimshian, on the other hand, have been greatly influenced by the northern Kwakiutl tribes, who have been, by the reciprocal influence of the former, in turn drawn away from the southern tribes of their own stock. In the legends of the Tsimshian we find much that is peculiar to themselves, much in common with those of the Tlingit and Haida, and a good deal borrowed from the northern Kwakiutl. On the other hand, their totemic organization is according to Boas a modification of that of the Kwakiutl, and radically different from that of the Haida and Tlingit.* The totems of the Tsimshian are the wolf, raven, eagle, and the bear, with no phratries; those of the Kwakiutl the raven, eagle, and the bear, with no phratries. It may possibly be that the Haida have been the centre of impulse on the northwest coast and that in their development they may have influenced the adjacent tribes to a great degree, but the weight of evidence is that, with no great originality in themselves, they yet present the curious and puzzling circumstance that they extensively borrowed their ideas from the other stocks but developed what they have borrowed with a marvelous skill and independence. They seem in themselves to have typified or intensified the representative characteristics of the Indian stocks of the northwest coast. Whether they have originated or borrowed their ideas can not be made apparent with the data at hand, but it may be well to here state briefly the peculiarities of the Haida as they have struck the writer in their relation to the other Indians of the region.

Tattooing, found hardly at all amongst the other tribes and then without much importance attached to it, is with them a fine art, and has both a bearing on their totemic system and the deepest significance in their ceremonies. The Tlingit and Tsimshian only occasionally etch the totemic figures on their painted bodies on ceremonial occasions, while their neighbors of whom we are speaking take every possible occasion to display their family crests. The carved totemic columns, stunted and dwarfed in the south amongst the Kwakiutl and also in the north amongst the Tlingit, here become the most elaborate and striking characteristic of the Indian village, so much so that a Haida settlement looks at a distance like a forest of stripped, bare tree trunks.† The mortuary and commemorative columns are also more elaborate here than elsewhere, and the memory of the dead is celebrated in feast, legend, and carving with the greatest pomp and ostentation. The Chilkat blankets pictured in Plates IX and X, and the copper shields from the Chilkat region are nowhere so numerous and elaborate as in the Queen Charlotte Islands. The art of basket-making, first

* Science, vol. XII, No. 299, p. 195.

† Boas is of the opinion that the carved heraldic columns originated amongst the Kwakiutl, and were adopted and developed amongst the Haida. Science, Vol. XII, p. 195.

developed amongst the northern Tlingit, has been taken up by the Haida with marked success. This is true also of metal-working. The conical-shaped basket-work hats so common about Dixon Entrance are particularly abundant in this group. The primitive copper and shell ornaments were nowhere in such demand as amongst the Haida. Labrets of the largest size are worn by the Haida women, who are the last on the coast to cling to this custom. The origin of the tobacco plant in this region is credited to the Queen Charlotte Islands, where the first potatoes were also raised. While the Haida are the most expert canoe-builders on the coast, they have sensibly adopted the Salishan or Wakashan type for certain purposes where strength has been the prime consideration. Cedar-bark mat-making developed amongst the Kwakiutl and practised by the Tsimshian is here also successfully imitated. Nowhere is the art of carving and painting amongst savage tribes so highly developed. Their houses are exceptionally well constructed, and the custom of erecting the carved column in contact with the front of the house and cutting a circular door-way through both, seems to be nowhere so universally practised. It is in their elaborate ceremonials that the most puzzling instances of foreign influence occurs. The cedar-bark rope head-dresses, sashes, and girdles amongst the Kwakiutl play the most important part in their winter ceremonial dances, and are only worn by certain people on special occasions and with special significance. Amongst the Haida the cedar-bark paraphernalia is just as elaborate and worn without any special significance. The whistles, trumpets, and other so-called musical instruments have more of a Tsimshian than a Haida origin, but are found in equal abundance and variety amongst both. The wearing of masks peculiarly enough has no especially deep significance amongst the Haida other than referring to and illustrating their totemic legends, yet nowhere in the world are such elaborate ones made and worn. Wooden masks are worn by the Eskimo of southern Alaska on ceremonial occasions, but it would seem that the custom of wearing masks in ceremonies amongst the Haida and Tlingit really originated in the wearing of them for protection in war, and that this custom was in no way borrowed or derived from the Eskimo.

The number of masks in the collections of the U. S. National Museum is out of all proportion to their importance or their use by the Indians. There are only one or two ceremonial dances in which they are worn, which is quite contrary to the accepted opinion. In most of the songs accompanying the Haida dances the Tsimshian language is used and many customs of the Tsimshian are avowedly followed. In this way, through the latter, probably some of the practices of the Kwakiutl reached the Haida. From all this it would appear that the latter have been influenced in a not remote period largely by others through the Tsimshian, but that the original affinities and relationship of the Haida were with the Tlingit.

Many resemblances of the Haida to widely remote stocks have been pointed out by writers, but to illustrate how futile such clues are in tracing the origin and relationship of the tribes of the world, a parallel is here briefly drawn between the Maori of New Zealand and the Haida. In point of physical resemblance both are of the Mongoloid type and both live on groups of islands whose climates are remarkably similar. Poole says of the climate of the Queen Charlotte Islands that the most graphic comparison he could draw was with that of the northern island of New Zealand.* Their political organization of the tribe, their ownership of land, and their laws of blood-revenge are similar. The men tattoo with designs intended to identify them with their sub-tribe or household, and they ornament their canoes, paddles, house fronts, etc., in somewhat the same manner as on the northwest coast. In Chapter IV, p. 267, under the head of "Rain Cloaks," Dixon (1787) is quoted as saying that the cloaks of the Haida and Tlingit were the same as those worn by the New Zealanders. In Chapter VI, p. 303, is also quoted from Dixon a statement that a Haida fortified house on an island of the Queen Charlotte group was "built exactly on the plan of the hippah of the savages of New Zealand;" and in Chapter V, p. 279, that the adzes of the Tlingit and Haida, made of jasper, were "the same as those used by the New Zealanders." The cloaks of shredded inner bark in the National Museum from New Zealand and the Queen Charlotte Islands are so much alike, that it takes a close inspection to distinguish them. In Plate XXXII, Fig. 167, a New Zealand paddle is reproduced, with a few from the northwest coast. The resemblance is marked and interesting. In Plate LV, Fig. 295, a Maori *tiki* is illustrated along with several Haida carved wooden columns. The carved wooden mortuary columns erected in front of the Maori houses are also suggestive, but it is safe to say that while all this is not in one sense accidental, yet the resemblances and similarities are as likely to have arisen from the like tendencies of the human mind under the same external conditions, or environment to develop along parallel lines as through contact of these tribes or through a common origin.

The Kaigani.—The Kaigani are a branch of the Haida of Queen Charlotte Islands, having for some cause or other split off from their brethren and settled across Dixon Entrance on the southern end of Prince of Wales Island and adjacent archipelago. As near as can be figured from the Indian accounts, this must have happened at the least one-hundred and fifty years ago. Their three principal villages now are Howkan, Kliquan and Kasa-an. Howkan is a thriving village, with a winter population of about three hundred. Under the ministration of the Rev. J. L. Gould, of the Presbyterian Board of Missions, it is fast losing its native characteristics. A saw-mill is run in connection with the mission, and the Indians are gradually building an American village in rear of the old time lodges. Many of the totemic columns have been cut down, and the native characteristics are fast disap-

* Poole, Queen Charlotte Islands, p. 237.

pearing. It is to be said in favor of the new order of things that Mr. Gould has fortunately impressed upon this village the stamp of his own personal qualities, thriftiness, industriousness, fair dealing, sobriety, and enterprise. Just below Howkan is the village of Koianglas, consisting of three houses and several interesting totemic columns. The population, made up of a few families, will soon be absorbed in that of Howkan. Nearly opposite Koianglas, on Dall Island, and also situated on Kaigani strait is the site of the old time village of Dat-ghaya. On the southern end of Dall Island, just north of Cape Muzon (the extreme southern point of Alaska) is the small village of Kaigani. The winter residence of the former population is now at Howkan. There are seven or eight houses, which are occupied only at certain seasons of the year, but there are no totemic columns. Kliu-quan or Kliuquan is said to be about half as large as Howkan, but to have retained its native characteristics almost intact. At the southern entrance to Cholmondeley sound is the site of the abandoned village of Chasina or Chachina. There is only one house there now and the stumps and remains of mortuary columns. Early voyagers describe it as a populous village in the early part of this century. At the head of Kasa-an Bay, at what is called Karbo Bay, is a small village, called by some authorities Kasa-an. Kasa-an proper is, however, on Skowl Arm, a branch of the bay. Being somewhat off the steamer route, and the missionaries never having settled there, Kasa-an has preserved its native characteristics more markedly than any other village in Alaska. Just above Kasa-an Bay, at Tolstoi Bay, is the northern limit of the Kaigani territory on Prince of Wales Island, as the adjoining arm, Thorne Bay, is in dispute between the Stikines and Kaigani. Tlevak straits, on the other side of the island, is the northern limit on the west shore. The hunting and fishing grounds, as claimed by the different tribes in Alaska, are as accurately plotted in Chart II as the data at hand will admit. From Admiralty Island south the writer has relied on his personal knowledge, based on inquiry in that region. The duty of the government in recognizing the Indian titles to these lands held by them for generations in the different families seems very clear, and an inquiry into the subject would not be amiss in connection with all governmental investigations and reports on this region.

As outlined in the synopsis of this paper, there are several chapters which ought to be added, to complete the study of the ethnology of this region. The character of the work yet to be done is such as to call for action by the government in undertaking it on a large scale. Linguistically, considerable has been accomplished. But with regard to the traditions, religious beliefs and practices, folklore myths, totemic subdivisions, shamanistic practices, fetishism, particularly all the local or tribal variations of each, there is a vast deal to be done.

If what is here submitted will accomplish no more than to call attention to the little known concerning the Indians about Dixon Entrance, the author's effort will not have been in vain.

CHART I.

BASED ON

U. S. COAST SURVEY SHEET NO. 701.



ORTHWEST COAST OF AMERICA,

DIXON ENTRANCE TO CAPE ST. ELIAS.

Nautical Miles.



Compiled from

Bancroft's Works, Native Races, Vol. I.

Petroff's Report, Census of 1880.

Notes by the Author, 1885, '86 and '87.

I. Tlingit, (Koloshan).

- | | |
|-------------------|-------------------------------------|
| 1. Mixed. | 2. Yakutat. |
| 3. Lituya. | 4. Chilkat. |
| 5. Takoo. | 6. Auk. |
| 7. Hoonyu. | 8. Sitka. |
| 9. Kootznahoo. | 10. Kake. |
| 11. Stikine. | 12. Hanga. |
| 13. Port Stewart. | 14. Tongass {Tlunahaste
Capo Fox |

II. Haida, (Haidan)

- | | |
|--------------|--------------------|
| 15. Kaigani. | 21. Haida (proper) |
|--------------|--------------------|

III. Tsimshian

- | | |
|------------|-------------------------|
| 16. Naase. | 17. Tsimshian (proper). |
|------------|-------------------------|

CHART I.

BASED ON
U. S. COAST SURVEY SHEET NO. 701.

NORTHWEST COAST OF AMERICA,

DIXON ENTRANCE TO CAPE ST. ELIAS.



Compiled from

Bancroft's Works, Native Races, Vol. I.
Petroff's Report, Census of 1880
Notes by the Author, 1885, '86 and '87.

I. Tlingit, (Koloshan).

- | | |
|------------------|-----------------------|
| 1 Mowat. | 2 Yakutat. |
| 3 Lelaya. | 4 Chiklat. |
| 5 Takoo. | 6 Ahk. |
| 7 Hooniya. | 8 Sitka. |
| 9 Kootznoheo. | 10 Kiska. |
| 11 Sitka. | 12 Hanga. |
| 13 Port Stewart. | 14 Tongass (Luna Fox) |

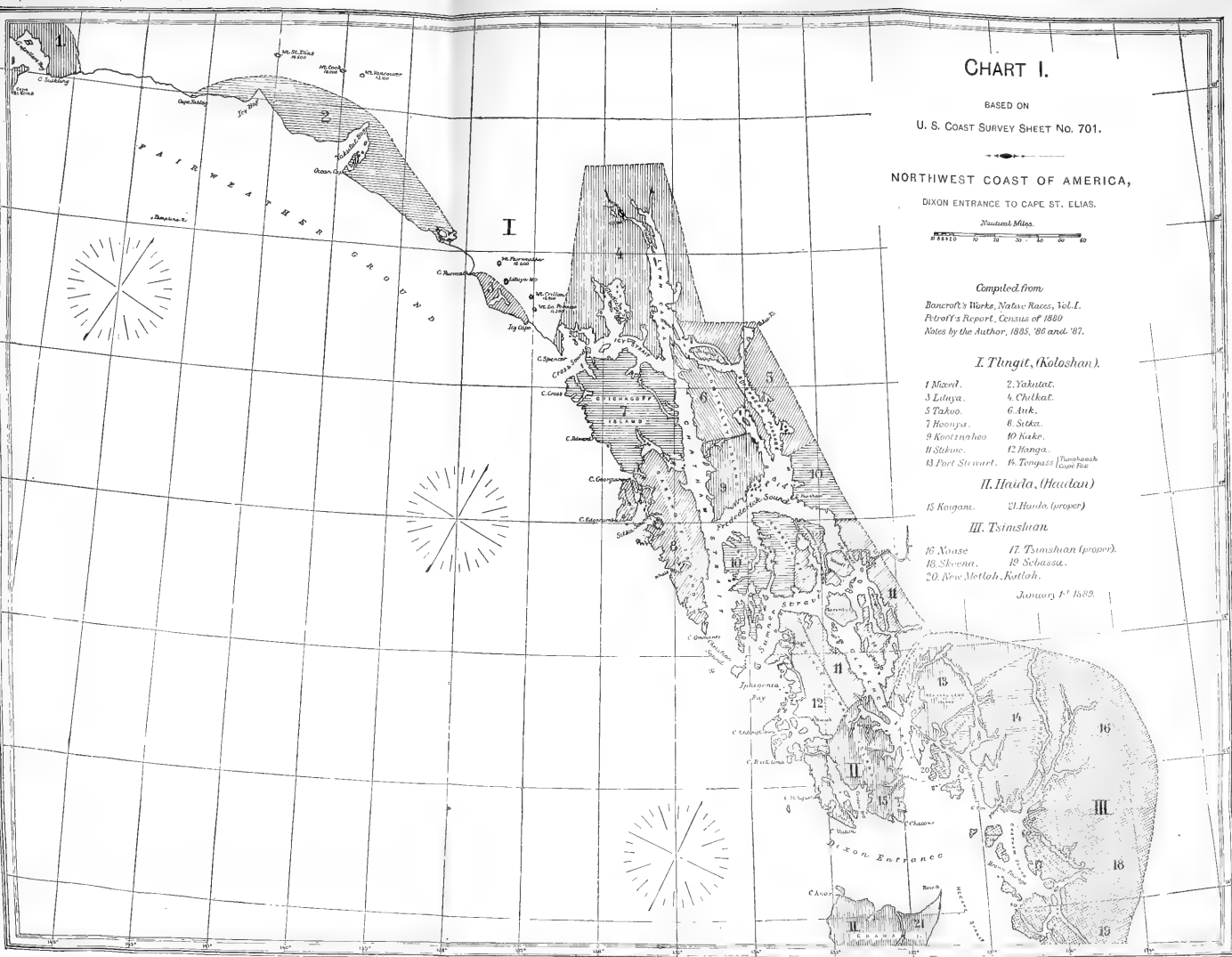
II. Haida, (Haidan)

- | | |
|------------|-------------------|
| 15 Kigami. | 16 Haida (proper) |
|------------|-------------------|

III. Tsimshian

- | | |
|------------|------------------------|
| 17 Noase | 18 Tsimshian (proper). |
| 19 Skeena. | 20 New Metlah-Kutlah. |

January 1st 1889.



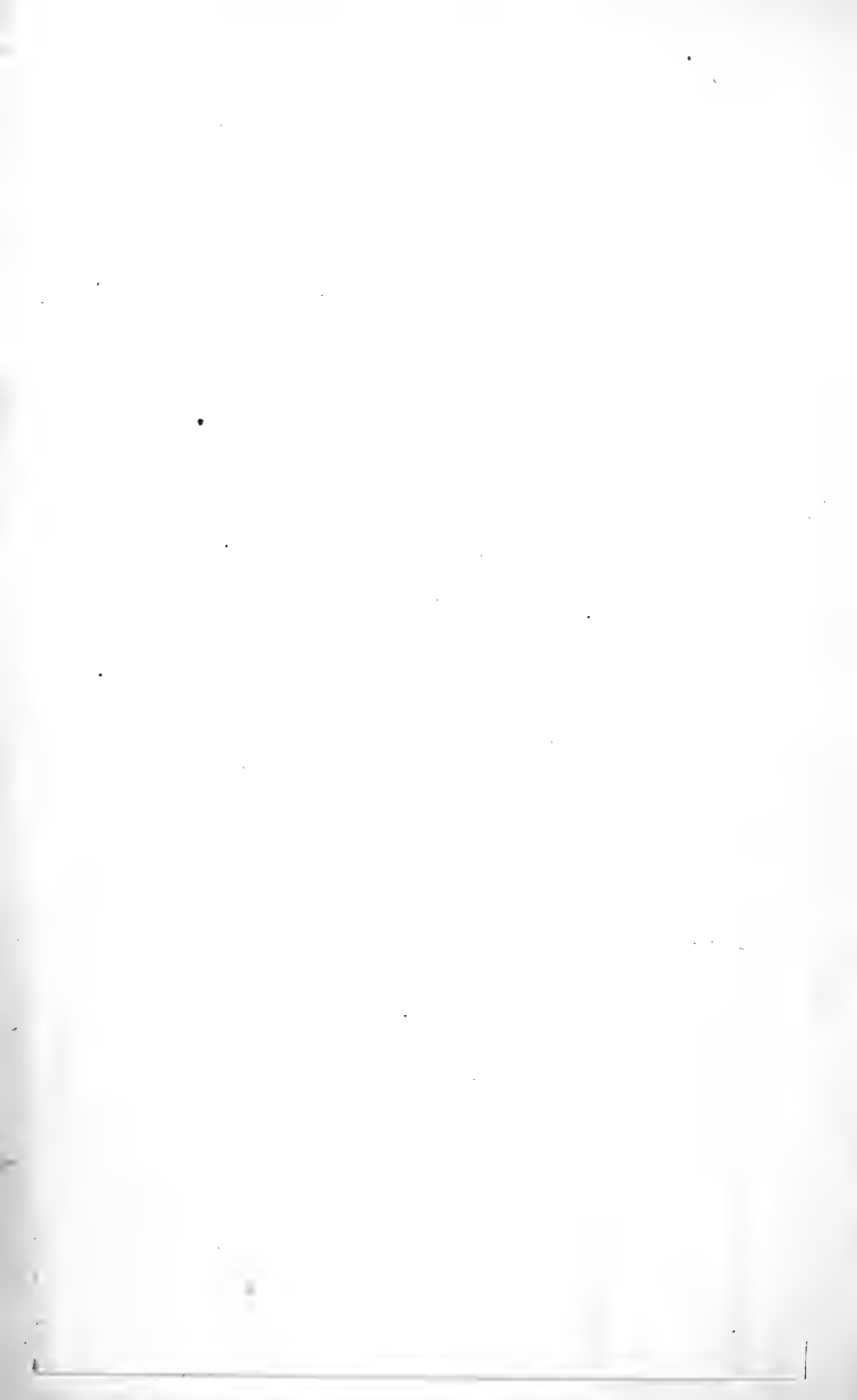


CHART II.

BASED ON

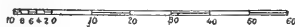
U. S. COAST SURVEY SHEET No. 700.



ORTHWEST COAST OF AMERICA,

CAPE FLATTERY TO DIXON ENTRANCE.

Nautical Miles.



Compiled from

- I. Geological and Natural History Survey of Canada. Map by W.F. Tolmie & G.M. Dawson.*
- II. Die Indianerstämme von Vancouver Id und an der Küste von British Columbia, Dr. F. Boas.*
- III. Chart of Department of Ethnology, U S National Museum. Prof. O T Mason, Curator.*

Showing location of Indian Stocks.

- I. Coast Salishan.*
- II. Wakashan (Nutkan).*
- III. Kwakiutl, (Haeltzukan).*
- IV. Bilgula, (Salishan).*
- V. Tsimshian.**
- VI. Haidan.**
- VII. Tlingit.* (Koloshan). -*

** See Chart I.*

January 1st 1889.

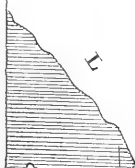


CHART II.

BASED ON

U. S. COAST SURVEY SHEET No. 700.

NORTHWEST COAST OF AMERICA,

CAPE FLATTERY TO DIXON ENTRANCE.

Nautical Miles.



Compiled from

I. Geological and Natural History Survey of

Canada, Map by W.F. Tolmie & G.H. Dawson.

II. Die Indianerstämme von Vancouver Id und

an der Küste von British Columbia, Dr. F.

Boas.

III. Chart of Department of Ethnology, U.S. Nat.

ional Museum, Prof. O.T. Mason, Curator.

Showing location of Indian Stocks.

I. Coast Salishan.

II. Wakashan (Nathan).

III. Kwakwaka' (Malt'ikan).

IV. Bilgula, (Salishan).

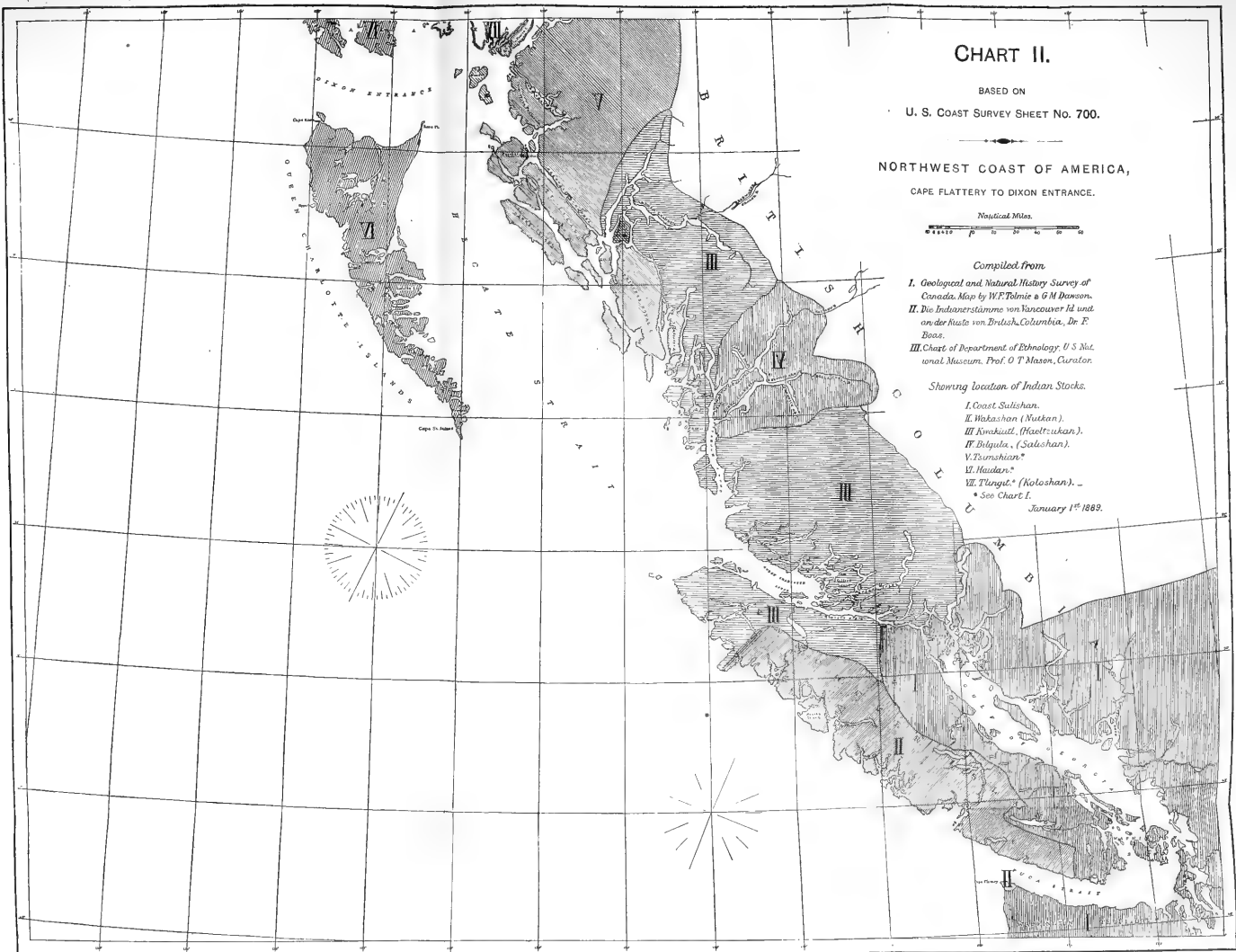
V. Tsimshian.

VI. Haida.

VII. Tongva* (Koloshan).

* See Chart I.

January 1st 1889.





A CATALOGUE OF THE HIPPISELEY COLLECTION OF CHINESE PORCELAINS:
WITH A SKETCH OF THE HISTORY OF CERAMIC ART IN CHINA.

By ALFRED E. HIPPISELEY.

NOTE.—In 1887 Mr. A. E. Hippisley, of the Imperial Maritime Customs Service of China, deposited in the National Museum a large and important collection of Chinese porcelains, with the understanding that they should be allowed to remain on exhibition for at least two years, and that the Museum should print a descriptive catalogue. The catalogue, carefully prepared by Mr. Hippisley, is now published, with the hope that it will enable visitors to the Museum to study the collection with more intelligent appreciation during the time it shall remain in the Museum.

For such information as we possess regarding the history of the Ceramic Art in China, we have till recently been chiefly indebted to the labors of the famous French sinologue M. Stanislas Julien, who, under the title of "*L'histoire et la fabrication de la Porcelaine Chinoise*," translated, and published in 1856, the History of the Manufactory of Chingtê-chên (a small town in Kiangsi province, but for centuries the most important seat of the Chinese porcelain industry,) a work written by a local magistrate in 1815 from older documents, and to the valuable letters from the same town written in 1712 and 1722 by the Jesuit missionary Père d'Entrecolles, the priest in charge there, which have been published in the collection of "*Lettres édifiantes et curieuses*." Within the past three years, however, very valuable additional light has been shed upon this subject by the labors of two gentlemen who are at once collectors and Chinese scholars, S. W. Bushell, M. D., physician to H. B. M. Legation, Peking, and F. Hirth, PH. D., a member of the Imperial Maritime Customs Service of China. Dr. Bushell has been fortunate enough to secure from among the dispersed library of the Prince of I, the MS. of a descriptive catalogue (of which native experts see no reason to doubt the authenticity), with illustrations painted in water color, of eighty-two celebrated specimens of old porcelain seen in the collections of noted connoisseurs or possessed by the author himself, one Hsiang Yüan-p'ien (styled Tzŭ-ching) a native of Tsui-li, an ancient name of Chia-ho, now Chiahsing-fu, in Chehkiang province, who was a celebrated collector of all kinds of antiquities during the latter half of the sixteenth century. A translation of this work, with explan-

atory details by Dr. Bushell, has been published in the *Journal of the Pekin Oriental Society*, under the title of "Chinese Porcelain before the present Dynasty," and it is, I believe, to be shortly republished in an amplified form with reproductions of the original drawings. Should this be done, the work would, in my opinion, form by far the most important and valuable contribution to our knowledge of this interesting subject. The information regarding Chinese porcelain which has been bequeathed to us by native authors is to be found in their encyclopedias or in special treatises chiefly based upon the encyclopedias. These are, however, compilations of such vast extent that the authors had not, nor could be expected to have, the intimate knowledge of an expert upon all of the very many subjects treated in them. Hearsay evidence or unverified rumors have thus but too often been allowed to crystalize into permanent record, with the result that it is impossible after an interval of centuries to attempt to reconcile the many contradictions of statement contained in the different works. In this catalogue, however, are contained the reproductions in color of eighty-two specimens of the choicest productions of a period extending over upwards of five centuries, from A. D. 960 to 1521, either possessed or seen by the artist, and scattered notes from the pen of one of the most noted connoisseurs of his age regarding the respective merits and rarity of the various kinds of ware. Existing realities are presented to us in place of the vague generalities and contradictory essays of the encyclopedists, and there can, I apprehend, be little doubt as to the comparative value of the two varieties of evidence. Dr. Hirth's contribution—"Chinese Porcelain: a study in Chinese Mediæval Industry and Trade"—is an important paper, treating chiefly of Chinese celadon porcelain and its distribution over the Mohammedan world.

EARLIEST MENTION OF PORCELAIN.

According to the legendary records of the prehistoric period of Chinese chronology, porcelain was already manufactured under Huang-ti, an emperor who is stated to have entered upon a reign of one hundred years in B. C. 2697; and the Emperor Yu-ti-Shun, another monarch of the legendary period, is believed to have himself made porcelain before mounting the throne in B. C. 2255. Under the succeeding dynasty of Chou, mention is made of an official director of pottery, and the processes of fashioning on the wheel and of molding are distinguished; sacrificial wine jars and altar dishes, coffins, and cooking utensils and measures being mentioned among the articles produced. Later, Chinese writers have, however, long admitted that the productions of that age could only have been of earthenware (possibly glazed), and that no greater antiquity can be claimed for the manufacture of real porcelain than the reign of the Han dynasty, which held the throne of China from B. C. 202 to A. D. 220, and that after this date progress in the system of manufacture was for a long period but slow. At one time, early in

the present century, European archaeologists were inclined to believe that an antiquity might be conceded to Chinese porcelain almost equal to the wildest claims of Chinese historians.* Some small porcelain bottles, decorated with flowers and inscriptions in Chinese, having been brought to Europe by M. Rosellini, who stated that they had been found in undisturbed Egyptian tombs dating from at least 1800 B. C., it was concluded that the manufacture of porcelain must have existed in China anterior to that date. M. Julien discovered, however, that the inscriptions upon these bottles were written in the grass or cursive character, a style of writing not introduced till B. C. 48; and later Mr. (afterwards Sir Walter) Medhurst, then an interpreter in the Hongkong government service, was able with Chinese aid to identify the inscriptions with quotations from poems written during the T'ang dynasty, and later than the seventh century of the Christian era. Any title based upon these bottles, which had evidently been surreptitiously introduced into the tombs by fraudulent Arabs, for so great an antiquity in the manufacture of Chinese porcelain, thus fell to the ground. Indeed, M. du Sartel, who has published an exhaustive work on "*La Porcelaine de la Chine*" argues that the manufacture of true porcelain in China did not commence till some centuries later than the period assigned to it by M. Julien, who dates it from the reign of the Han dynasty and somewhere between the years B. C. 185 and A. D. 87. This point will be considered when we come to the reign of the T'ang dynasty, the period in which M. du Sartel claims true porcelain was first made.

HAN DYNASTY, B. C. 202 TO A. D. 220.

It is during the Han dynasty that mention is first made of *Tz'u*, the Chinese designation of porcelain. It was then made at Hsinp'ing, a district in the state of Ch'eu, and corresponding with the modern Huaining district, in Honan province.

WEI DYNASTY, 221 TO 265.

Under the Wei dynasty, which from A. D. 221 to 265 enjoyed, with the dynasties of Wu and of Han of Szechuen, divided supremacy as rulers of China, manufactories are mentioned at several places in the department of Hsi-an, in Shensi province (the products of which were known as Kuanchung-yao), and at Loyang, in Honan province (products termed Loching-t'ao), as supplying porcelain for the imperial palace.

CHIN DYNASTY, 266 TO 419.

Under the Chin dynasty (A. D. 266 to 419) another manufactory is mentioned as existing in the present department of Wenchou, in Chehkiang province, which produced porcelain (known as Tung-ou t'ao) of a blue (or possibly celadon) color which was held in high esteem.

*Rosellini: *I Monumenti dell' Egitto*, 1834. Sir John Davis: *The Chinese*, 1836. J. Gardener Wilkinson: *Manners and Customs of the Ancient Egyptians*, 1837.

SUI DYNASTY, 581 to 617.

Under the Sui dynasty, in spite of its short-lived existence, considerable progress appears to have taken place. Mention is made of a green porcelain manufactured under the directions of Ho Chou or Ho Kuei-lin, president of the board of works, to replace glass, the method of making which had been forgotten "since its introduction into China by Indian or Syrian artisans about A. D. 424."* A celebrated workman named T'ao Yü† is said to have produced porcelain so like jade, that is, semi-transparent and of vitreous appearance, that his vases were known as "artificial jade;" and about the close of this or the beginning of the following dynasty, porcelain, white in color and bright as jade (known as Ho-yas, *i. e.*, Ho porcelain) was manufactured by Ho Chung-ch'u, a workman who came from Hsinp'ing, the district where porcelain (*tz'u*) had its first origin under the Han dynasty. An imperial decree of 583 ordered the establishment of a manufactory at the place now known as Chingtê-chên (so named from the title of the period,‡ Chingtê, in which it was inaugurated) for articles for the use of the imperial household, and several others sprang up in the vicinity shortly afterwards.

* Dr Hirth: China and the Roman Orient, pp. 230 *et seq.*

† The producer's reputed name, meaning as it does "faience or klin jade" sounds apocryphal, and seems more likely to have been the term by which this ware was known.

‡ It being contrary to etiquette to mention the personal name of a Chinese sovereign, the practice was introduced B. C. 163, under the earlier Han dynasty, of the monarch, on his accession to the throne, selecting some title for his reign in place of the title of Prince so-and-so, which had been usually employed prior to the time of Shih Huangti, B. C. 221. These titles were usually so chosen as to be of happy augury, but if, in spite of such good omen, disorder or misfortune ensued or some other reason seemed to render a change advisable, one title would be abandoned in favor of another. This title is termed *nien-has*, "the year designation," because so long as it lasted the date of all events was chronicled as such and such a year of such and such a title or *nien-has*. Upon his death, however, the emperor received an honorific title, and but one title, no matter how many *nien-has* or "year designations" he may have employed while alive, under which the religious ceremonies due to him were offered, and which is therefore termed the *mias-has* or "temple designation." Thus it results that when in Chinese literature a deceased emperor is personally alluded to, he is spoken of under his "temple designation," while if the date of an event which occurred during his reign is quoted, it is said to have taken place in such and such a year of the appropriate "year designation." Take as an instance the last emperor of the Yüan dynasty, who reigned from 1333 to 1367: if spoken of personally, his title would be Shunti of the Yüan dynasty; but if the year 1334 were spoken of, it would read "the second year of (the) Yüan t'ung (period)," and similarly 1336 and 1334 would read "the second year of (the) Chihyüan (period)" and "the second year of (the) Chihchêng (period)." Owing to the fact that dates are thus rendered by the Chinese, foreign writers have at times erroneously spoken of the *nien-has* or "period" as the reign, whereas the *mias-has* or "temple designation" alone corresponds to the western idea of reign, so far as any time prior to the Ming dynasty is concerned. During the Ming and its successor, the present dynasty, however, each emperor has practically used but one "year designation" throughout the period he has occupied the throne, practically because though Ying Tsung of the Ming dynasty employed two such designations, they were separated by an interreg-

T'ANG DYNASTY, 618 TO 906

Under the succeeding, the T'ang dynasty, which ruled from 618 to 906, the manufacture appears to have spread over the greater part of the empire, and to have reached in some places a degree of excellence far in advance of that previously attained. The following varieties are specifically enumerated (in the reverse order of their merit):

The *Hungchou-yao*, a yellow black porcelain from Hungchow, the present department of Nan-ch'ang, in Kiangsi province.

The *Shou-yao*, a yellow porcelain, from Shouchow in (present) Kiangsu province.

The *Yo-yao*, a blue porcelain according to Julien, but the color was more probably a pale green, for the Ch'a ching, a "Treatise on Tea" written in the eighth century, says cups of this ware gave to the infusion a green tint—from the department of Yochou, in (present) Hunan province.

The *Wu-yao* and *Ting-yao*, of colors unspecified, from the department of Wuchou, corresponding with the present department of Chinghua in Chehkiang province; and from the department of Tingchow, corresponding with the present district of Chingyang in the Hsi-an department, Shensira province, respectively.

num of seven years' duration; and though T'ai-Tsung-Wên of the present dynasty also employed two, he seldom or never comes to the notice of foreign writers. The term "period" being in any case an inconvenient one, and the "year designation" under the Ming and the present dynasty being synchronous with the reign, it seems hypercritical to insist on uniformly translating *nien-has* by "period" in the case of emperors of those dynasties, especially as consistency would require that names so well known to every school-boy, as K'anghsi, Yungchêng, and Chienlung be replaced by the proper titles, Shêng-Tsu-Jên Huangti, Shih-Tsung-Hsien Huangti, and Kas-Tsung-Shun Huangti. In the following pages, therefore, the *nien-has* or "year designation" has been rendered "period" prior to the accession of the Ming dynasty in 1336, and subsequently to that date as "period" or "reign," according to circumstances.

The dates upon porcelain are also usually recorded by the use of the *nien-has* as above described, though other marks are mentioned by Chinese writers, and if the article has been manufactured for the special use of some emperor or prince, it will possibly bear the name of the pavilion or portion of the palace for which it is specially intended. Chinese writers state that the practice of marking the date of manufacture was instituted by the Emperor Chên Tsung of the Lung dynasty, when, on the establishment of the government factory at Chingtê-chên, he ordered that each article manufactured should be marked with the *nien-has* then used "Chingtê, 1004 to 1007." Foreign writers on the marks upon porcelain specify other marks of the same dynasty, but upon what authority is not clearly specified. So far as my own knowledge goes, I am unaware of any such date-marks being inscribed under the glaze prior to the Ming dynasty. Since that time, putting aside monochromes, which, in probably the majority of instances, bear no mark, they have been employed uninterruptedly, except during a portion of K'anghsi's reign. In 1677 the magistrate in charge at Chingtê-chên forbade the practice alike of inscribing the date and of portraying the actions of celebrated personages, on the ground that if the article were broken, disrespect might be shown to them or to the emperor. During this period, which was of but short duration, however, a leaf, a censor, and other marks replaced the *nien-has*.

The *Yüeh-yao*, a blue, or for the same reason as in the case of *Yo-yao* a pale green porcelain, much sought after from the earliest times, from Yüehchou, corresponding with the present department of Chaohsing in Chehkiang province; and lastly

The *Shu-yao* or Szechuen porcelain, *facile princeps* among the productions of that age, snow-white in color, with a clear ring, thin but strong, and graceful in shape, from the city of Ta-i, in the department of K'uingchou, in (present) Szechuen province.

THE ANTIQUITY OF TRUE PORCELAIN.

As already stated, M. du Sartel declines to admit the antiquity attributed by M. Julien, on the authority of the native work he translated, to the production of true porcelain in China, namely, the time of the Han dynasty, and somewhere between the years B. C. 185 and A. D. 87. His arguments, however, are marked by strange inaccuracies. Having referred the productions of Hungchou, Shouchou, Yochou, and Yüehchou, which, as above, Chinese authors state to have been first manufactured under the T'ang dynasty, back to the Ch'in dynasty, that is, to a period nearly two centuries earlier, M. du Sartel argues that the remarks made in the Treatise on Tea above referred to (which, when enumerating the varieties of T'ang porcelain, classifies them merely according to the suitability of their colored glazes to impart an agreeable tint to tea held in them) tend to show that the bowls or cups in question could not have been transparent porcelain, bearing a decoration in the colors named under the glaze, but must have been of an opaque substance, covered internally with a thick colored glaze. In this view he considers himself supported by the description given of the Sui dynasty manufactures. This, he argues, gives an idea of transparency, but the transparency is due merely to the use of a more vitreous composition or to a more thorough baking than had been previously customary, and the white color and other distinctive qualities of true porcelain are only to be first found in the productions of the T'ang dynasty—that is, in those productions which M. du Sartel, in disregard of the statements of Chinese writers, the only authorities we have to guide us, himself elects to refer to this dynasty. Secondly, he argues that the porcelain manufactured under the Sui and preceding dynasties is uniformly denominated *t'ao*, that from the latter half of the T'ang dynasty, this word is replaced by the designation *yao* which has continued in use up to the present time; and that the change in name coincides with a change in the character of the porcelain manufactured.

The word *yao* as a designation of porcelain came into *general* use, it is true, at the commencement of the T'ang dynasty, but that fact would scarcely justify the conclusion that it was designedly introduced in order to mark a synchronous change in the character of the

ware, since the same word, which is in any case but a neutral term applicable to any kind of pottery, is met with four centuries earlier to designate some of the products of the Wei dynasty; and, besides, in the titles of the chapters in the Provincial Topographies dealing with these manufactures, also in the Treatise on Pottery (the T'ao shuo, written by Chu T'ung-ch'uan during the reign of Chien-lung, 1736 to 1795, the authority on this subject), and in the work translated by M. Julien, it is the word *t'ao*, not *yao*, that is used to designate porcelain. Chinese terminology is but an insecure foundation on which to base arguments, and it might with no less fairness be contended, as the Chinese author, translated by M. Julien does contend, that the introduction of the character *tz'ü*, signifying "porcelain," and employed down to the present day to designate the pottery of the Han dynasty, was rendered necessary by the production of an article hitherto unknown, and that this article was true porcelain.

On different grounds from those advanced by M. du Sartel, Dr. Hirth, also, refers the earliest manufacture of true porcelain to the T'ang instead of to the Han dynasty. He says: "The Chêng-lei-pên-ts'ao, the pharmacopœia of the Sung dynasty, compiled in 1108, under the head of 'Porcelain Earth' (Kaolin) or *Pai-ngo*, quotes from the writings of T'ao Yinchü that 'this substance is now much used for painting pictures,' and from the T'ang pên-ts'ao, the pharmacopœia of the T'ang dynasty, compiled about 650: 'This earth is now used for painters' work, and rarely enters into medical prescriptions; during recent generations it has been used to make white porcelain.'" As T'ao Yin-chü was a celebrated author on pharmaceutical and other scientific subjects, who died A. D. 536, Dr. Hirth argues that had the *pai-ngo* or kaolin been used in his time on an extensive scale in the manufacture of chinaware, so learned a writer would almost certainly have mentioned the subject, and he therefore concludes that the use of porcelain earth for the manufacture of pottery came into use later than 536, and at some time during the T'ang period, prior to 650, about which date the pharmacopœia of that dynasty was compiled.

This negative testimony does not, however, dispose of the strong argument in favor of the earlier date, afforded by the coining during the Han dynasty of a new word, *tz'ü*, to designate the productions of that age, a word which, as already stated, is still in ordinary use to designate porcelain. On this point Dr. Hirth thinks he has detected that the word *tz'ü* has had different significations at different epochs, for while in the Shuo-wên, a glossary published A. D. 100, *tz'ü* is defined as "earthenware," it is defined in the dictionaries of the Sung period—nine centuries later—as "hard, fine-grained pottery;" and calling attention to the fact that there are now two forms of this character in use, the original form with the radical denoting "brick or earthen material," and a later form with the radical "stone," he thinks that "this substitution by later generations for the original sign of a character of the same sound, but with a radical more appropriate to the category of the word

as it was at the time understood, may be regarded as indicating a "change from the original meaning."* Even if this be true, no data are thereby afforded to help fix even the approximate date of change in the method of manufacture. For after the change in the system of manufacture had taken place, a considerable period would almost certainly elapse before an author of sufficient literary importance to impose a new style of writing on the nation would learn sufficient regarding the altered ingredients employed to have the corresponding modification in the descriptive word suggested to his mind, and a still longer period would elapse before this newly-coined word would pass into current use.

The authors translated by M. Julien, too, state distinctly that the introduction of the later form—that with the radical "stone"—and the continued use of it, are due to ignorance and error. At Tz'ü-chou, a district anciently within the department of Changtê, in Honan province, but now belonging to the department of Kuangp'ing, in Chihli province, a kind of porcelain was made during the Sung dynasty which enjoyed a very high reputation, the plain white specimens bringing even higher prices than the celebrated productions of Tingchow, which it closely resembled. This ware was known as Tz'ü ware, or porcelain from Tz'u-chow, and thus this form of the character, which was originally a local designation, not an intentional modification of the older form introduced to typify a modification in the system of manufacture, passed into general use to designate not merely this special class, but (erroneously) all porcelain.†

ORIGIN OF TERM "PORCELAIN."

It is a curious coincidence that no less diversity of opinion has existed regarding the date at which the western equivalent of this word *tz'ü*, the term "porcelain," was introduced and the article it has at different times been used to designate. Père d'Entrecolles affirms that the name porcelain was first given by the Portuguese to the Chinese vases imported by them into Europe in 1518, but further researches into the history of the word by M. Brongniart and M. de Laborde show that the name arose from a supposed resemblance in appearance of surface between the transparent pottery of the East and certain shells which had been previously so designated. M. de Laborde says:

Les anciens ayant trouvé ou cherché une ressemblance entre ce qu'ils appelaient porca et certaines coquilles, donnèrent à celles-là le nom de porcella. Le moyen âge accepta cette analogie en appelant porcelaine une famille entière de coquilles, et aussi les ouvrages qui étaient faits de nacre de perle, et, par métonymie, la nacre seule tirée de la coquille.

* Dr. Hirth: *Ancient Chinese Porcelain* p. 2.

† Julien, *op. cit.*, p. 29: This is, I think, probably the true explanation of the change of form; though, writing from memory as I do, and without the necessary works at hand to refer to, I can not state this to be a fact. I believe that the only correct form of writing this character recognized at the present time by the Imperial Academy is the original form, with the radical "earthenware," not that with the radical "stone."

A partir du XIV^e siècle, les gardes des bijoux décrivent en grand nombre dans les inventaires, et les experts mentionnent et estiment dans leurs rapports, des vases, des ustensiles de table, des tableaux de dévotion, et des bijoux faits de la porcelaine. Cette expression à travers quelques variantes sans importance, reste la même et s'applique aux mêmes choses jusqu'au XVI^e siècle; de ce moment elle se bifurque pour conserver d'une part sa vieille signification, et s'étendre de l'autre à des vases et ustensiles d'importation étrangère qui offraient la même blancheur nacrée. C'était la poterie émaillée de la Chine qui s'emparait de ce nom auquel elle n'avait droit que par une analogie de teinte et de grain.

M. du Sartel is strongly of opinion that the word porcelain was used in its present sense far earlier than the date assigned by M. de Laborde, and in support of his view quotes the mention of "pourcelaine" in royal inventories dating from 1360 to 1416 for France, and from the beginning of the sixteenth century for the Roman Empire. These documents appear to me, however, rather to support M. de Laborde's views; for the details given in the French inventories of representations on the articles named, of our Lord, the Blessed Mother, and of Saints, and of their decoration with jewels,* would seem to make the possibility of their being oriental porcelain more than doubtful; while the inventories belonging to the Roman Empire, *i. e.*, from the date M. de Laborde says the word was applied to oriental pottery, do mention articles undoubtedly of real porcelain, all, with one exception, in monochrome.

A statement quoted by M. du Sartel from Pierre Bélon, of 1553, is worth reproducing, as evidence that in the latter half of the sixteenth century the word porcelain was still applied to shells, to mother-o'-pearl, to oriental pottery, and even to Italian faience. He says:

Des vaisseaux de porcelaine, qu'il a vus vendre en public au Caire, lesquels vases de porcelaine sont transparents et coustent bien cher au Caire et ilz disent mesme-ment qu'ilz les apportent des Indes, mais cela ne me sembla vraysemblable; car on n'en voirroit pas si grande quantité ni de si grandes pièces s'il les falloit apporter de si loing. Une esguière, un pôt ou un autre vaisseau, pour petite qu'elle soit, conste un ducat; si c'est quelque grand vase, il coustera davantage.

Et les voyant nommés d'une appellation moderne et cherchant leur étymologie françoise, j'y trouve qu'ils sont nommés du nom que tient une espèce de coquille de porcelaine. Mais l'affinité de la diction *Murex* correspond à *Murrhina*; toutefois je ne cherche l'étymologie que du nom françois en ce que nous disons vaisseaux de pourcelayne, seachans que les Grecs nomment la mirrhe de *Smirna*, les vaisseaux qu'on vend pour ce aujourd'hui en nos païs, nommez de pourcelaine, ne tiennent tache de la nature des anciens; et combien que les meilleurs ouvriers de l'Italie n'en font point de telz, toutefois ils vendent leurs ouvrages pour vaisseaux de pourcelaine, combien qu'ils n'ont pas la matière de mesme. † ‡

* With regard to the last mentioned, it should be stated that in the magnificent Dresden collection, formed chiefly by Augustus the Strong, King of Poland and Elector of Saxony, between 1694 and 1705, there is a small ivory-white plate with uncut rubies and emeralds in gold filigree let into the paste, with the character *fu*, happiness, on the foot in blue under the glaze, which is said to have been brought by a crusader from Palestine in the twelfth century.

† Du Sartel: *Porcelaine chinoise*, p. 33.

‡ Florio, in his Italian dictionary (1598), gives "*Porcellana*, a kinde of fine earth called Porcelane, whereof they make fine China dishes called Porcellan dishes. *China*,

THE FIVE DYNASTIES, 907 TO 959.

To the T'ang succeeded the epoch of the five dynasties, all of them short-lived and naming themselves successors to some one of the more important dynasties that had preceded them.

Under one of these, the Posterior Chou, during the reign of the Emperor Shih-tsung (954 to 959), a celebrated porcelain, far superior to any yet produced, was manufactured in the district of Pien, the present department of K'iaifêng, in Honan province. It is described as being sky-blue in color, of brilliant surface, thin as paper, and giving out a clear musical sound when struck, the only defect being that the base was apt to be disfigured by the remains of the coarse sand on which the vessel had rested in the furnace, and which had become attached to it during the process of baking. The color was adopted in obedience to an imperial order that porcelain intended for palace use should thenceforward be "as blue as the clear sky after rain." This porcelain, which was consequently termed *Yü-yao*, "Imperial porcelain," and after the accession of the succeeding dynasty *Ch'ai-yao*, Ch'ai porcelain (Ch'ai being the Emperor's family name), was very highly prized, and becoming in subsequent years, owing to its delicate make, exceedingly rare, the smallest fragments were treasured as cap ornaments or necklace pendants. Porcelain, blue in color and with the characters "blue as the clear sky after rain" stamped in the glaze, is at the present time to be obtained in China. It is scarcely necessary to state, however, that such specimens do not date from the time of Shih-tsung; on the contrary, they are of quite modern manufacture. Already in the sixteenth century Hsiang Tzu-ching writes in the preface to his catalogue, "In the present day men search for a fragment of this porcelain without being able to find one, and declare it to be but a phantom." *

EARLIEST PORCELAIN EXTANT DATES FROM SUNG DYNASTY.

In truth, the description which has been attempted of the varieties of porcelain hitherto enumerated possesses merely a historical interest. No specimens manufactured prior to the advent of the Sung dynasty have survived to the present day, and even of the Sung productions the finer kinds have entirely disappeared. Such specimens as have weathered the storms and dangers of the subsequent eight centuries are, so far as I am aware, only *céladons* of considerable solidity—chiefly Lungch'üan or Chünchow ware—or small pieces of no great fineness. Three centuries ago even the finest varieties were already scarce, as is evident

a Venus basin," *i. e.*, a Venice basin. It may remain a question whether Majolica, exported by way of Venice, was called *China* from a supposed resemblance to oriental porcelain, or whether the wares alluded to by Florio were in fact oriental. Minsheu, in his Spanish dictionary (1599), gives "*Porcellana*, a kinde of earthen vessell painted; costly fruit dishes of fine earth, painted"—quoted in Marryat's History of Pottery and Porcelain, p. 242.

*Bushell: Chinese porcelain before the present dynasty, p. 72.

from a passage in the *P'ing hua-p'ü*, an essay on flower-pots and flowers in pots, from the pen of Chang Ch'ientê, an author who wrote near the close of the Ming dynasty, that is, about the beginning of the seventeenth century :

In ancient times no vases were made of porcelain, and up to the T'ang dynasty all such vessels were made of copper. It was not till then that pottery came into vogue. After this period we find a large number of classes of porcelain, such as the kinds known as Ch'ai (that described above), Ju, Kuan, Ko, Ting, Lungch'ian Chünchou, Changshêng, Wuni (all of the Sung dynasty period), Hsiantê and Ch'ênghua (of the Ming dynasty). Among antiquities, copper articles are the best; of porcelain, the Ch'ai and Ju kinds, though the best of all, have ceased to exist; Kuan, Ko, Hsüan, and Ting porcelains are the most precious curiosities of the present day; whereas the porcelains called Lungch'ian (the heavy old celadons of modern collectors), Chünchou, Changshêng, Wuni and Ch'ênghua are esteemed as objects of only secondary value." *

As Chang Ch'ien-tê further says that he constantly met with specimens of Juchou porcelain, and since vases of that ware are figured in Hsiang Tzū-ching's catalogue, it would appear that this highly esteemed porcelain must have disappeared from the market towards the close of the sixteenth century. It is curious, too, that while Chang Ch'ien-tê places the productions of the Ch'ênghua period (1465 to 1487) at the foot of the list of porcelains of "only secondary value," the prices paid for this ware within a century of its production were very high. In Hsiang Tzū-ching's catalogue the price paid for a tazza-shaped cup is stated to have been 60 taels (or \$90 gold); and of two miniature wine-cups he says, "these are choice specimens of the wine cups of this celebrated reign, and are valued at 100 taels (\$150 gold) the pair, yet now even for this money it is impossible to get them."†

SUNG DYNASTY, 960 TO 1259.

The porcelain manufactured under this dynasty appears to have far excelled in quality and delicacy of workmanship all that preceded it, the Ch'ai-yao alone perhaps excepted. The shapes and ornamental decorations appear to have been modelled, as a rule, after ancient bronzes, as figured in illustrated catalogues of the most celebrated specimens of such vessels (as the Po-ku-t'u), published during the Hsüan-ho period, 1119 to 1125, and the K'ao-ku-t'u; and when not modeled after such ancient designs, the vessel took the form of some natural object, as a tree or flower or of some animal real or imaginary. In the former the pattern was engraved with a pointed style in the paste, and was broken here and there by lions' or dragons' heads in bold relief, with an elaboration and wealth of ornament hitherto undreamed of. That a remarkable degree of proficiency had by this time been obtained in the Ceramic art is evident from the descriptions pre-

* Hirth: Ancient Porcelain, p. 10.

† Bushell: *Op. cit.*, No. 55, 59.

served by Hsiang Tzŭ-ching of some specimens of Tingchou ware seen by him.

(1) A sacrificial jar in the form of an elephant from an ancient bronze design. The body forms the wine vessel, the uplifted trunk the spout, a narrow canopy arching over the saddle the handle, to which is attached a round cover ornamented with geometrical and spiral scroll borders surmounted by a knot. The rope girths and ornamental details engraved under a white glaze.

(2) A branched pricket candlestick—a slender pillar on a solid foliated stand curves at the top to end in a phoenix-head, from the back of which hangs a ring chain, which suspends the stem of a lotus, branching into three flowers to hold the candles, which are shaded by a huge overhanging leaf. Ornamented with engraving under a pure white glaze.

(3) A jar which was of irregular quadrangular section, carved in relief after an ancient bronze design, with lobes on the body, a scroll border below, and a band of ornament in the form of coiled dragons round the neck. Loop handles terminating in horned heads and with rings hanging from them project from the neck. Covered with glaze the color of ripe grapes, transparent and of a perfect luster—a beautiful vase to hold flowers for the table.*

INTRODUCTION OF COLORED DECORATION.

Prior to the Sung dynasty the external color of all porcelain appears to have been solely determined by that of the glaze, and to have been almost entirely monochrome. In a few instances vases were covered with parti-colored glazes, which were apt to flow into one another in the heat of the kiln, and so gave rise to the fortuitous productions known as *Yao-pien* (the French *flambés*), articles the decoration of which “changed during the process of baking.” The Sung porcelain was essentially, I believe, of the same character, the coloring of the article produced being determined only by the kind of glaze which was spread over the paste or biscuit.

With the sole exception of the Nanfêng ware, and a portion of that from Linch’uan, produced during the Yüan dynasty, none of which seems to have survived to the present day, but which is described as having been decorated with flowers coarsely painted under the glaze, I can find nothing in the works of Chinese writers on this subject to justify the concession of a greater antiquity than the early part of the Ming dynasty, *i. e.*, the first half of the fifteenth century, to the ornamentation of vases with arabesques and scroll work, with landscapes, historical scenes, or genre paintings in several colors.

This conclusion, if correct, is a point of considerable importance as an aid in determining the true age of specimens which are at times credited with an origin far remote. It is true that celadon vases into the ornamentation of which leaves enter, are sometimes described as having the leaves veined with dark green, but these deeper shades may result from the fact that the ornamentation has been engraved in the paste, and that the coloring matter has sunk into the line of engraving, thereby producing a darker shade along the lower levels. Other specimens of

* Bushell: *Op. cit.* Nos. 33, 80, 18.

céladon ware had one or sometimes two bands of ornamentation of a deeper green than the body of the vase. This deeper tone might, however, have been produced by a double layer of glaze; in any case the peculiarity would not amount to ornamentation in several colors in the sense in which I use that expression. Again, the single specimen of black Tingchou porcelain illustrated (and indeed ever seen) by Hsiang Tzŭ-ching is described as "a duck-headed vase, bottle shape, with swelling body and ringed neck, which curves over to end in a duck's head, a round orifice with a small cover being on the convexity of the curve. The black color is painted on the head and neck, gradually fading away on the body of the vase, which is enamelled white."* This description conveys the idea that the head and neck of the duck were covered with black glaze, the body of the vase with white glaze, and that in the baking the former spread downwards and gradually merged into the white of the body. It in no way invalidates the conclusion above suggested.

It will be advisable to examine in greater detail the several varieties of porcelain manufactured under this dynasty; following the order of merit usually ascribed to them by Chinese writers.

JU-YAO.

Ju-yao or *Juchou* porcelain.—Chinese authors state that the porcelain manufactured at Tingchou (see p. 402), being unfit for presentation to the emperor, the establishment of a factory for the manufacture of more suitable articles was ordered at Juchou, in Honan province. According to some writers the defect of the Tingchou ware was its gritty character; according to others, the frequency of cracks caused by too rapid or careless baking. As, however, they agree in ascribing the introduction of *Ju-yao* and its success to the early part of the Sung dynasty, *i. e.*, to the very time from which date the finest specimens of the Tingchou porcelain, it is difficult not to conclude that native authors, writing centuries later, have ascribed the establishment of this factory to erroneous causes.

The finest specimens, which were very thin and delicate, were superior to imperial ware (*Kuan-yao*), and were of either plain or cracked †

* Bushell: *Op. cit.* No. 35.

† Crackling (*craquelure*) was originally considered in Europe a defect of baking, which resulted from a lack of homogeneity between paste and glaze, causing one to contract more rapidly than did the other. It was not till a comparatively recent date that the actual facts came to be appreciated, namely, that in the eyes of the Chinese the *craquelure* is a species of decoration, and that they have a special kind of enamel, into the composition of which steatite enters largely, the sole object of which is to produce this curious appearance. By means of this enamel they can at will cover the surface of a vase with any one of a variety of *craquelure*, either large "like cracks in ice," or small as "the fishroe," "the dodder" or "the crabs' claws." In some specimens, bands are found cracked separating other bands not cracked; or colors, usually either black or red, are rubbed into the crackling to render it more apparent, or to impart a tinge to the entire surface. In other specimens again,

surface, with the ornamentation engraved under the paste. The *craquelure*, though coarse in inferior specimens, must in the better grades have been very close and fine, as it is described as resembling fishroe. But that not crackled was the most highly esteemed. Hsiang Tzŭ'-ching, describing a beaker of old bronze design with engraved decoration under a bluish-green color not crackled, speaks of it as "a rare kind of Juchou ware." In color it was céladon. In one place this porcelain is described, it is true, as being like the sky after rain, but as elsewhere it is stated to have resembled the *Ko-yao*, or crackled céladons in color, though somewhat darker in shade, there seems no reason to doubt that its real tint was bluish-green, *i. e.*, céladon, especially as the specimens of this ware illustrated in the catalogue translated by Dr. Bushell are so painted.* Hsiang Tzŭ'-ching, the author of this catalogue, after describing a vase 6½ inches high, which is stated to have cost 150,000 cash, or about \$150 gold, says "specimens of Juchou ware are very rare, and, when met with, are usually plates and bowls. A perfect unbroken vase like this is almost unique, and as it excels both Kuan and Ko porcelain both in form and glaze, it is far more valuable." Within three or four decades later, as has already been stated, it seems to have been impossible to find any specimens at all of this ware.

KUAN-YAO.

Kuan-yao—*i. e.*, official or government porcelain—was the produce of the imperial factories established under the Sung dynasty between the years 1107 and 1117 at Pienliang, the present department of K'ai-fêng, in Honan province, and after the removal southwards of the court before the advancing Mongols, at the southern capital, Hangchou, in Chehkiang province. During the Takuan period (1107 to 1110) the

though for what reason is not known, the paste, after having been decorated, is covered with a crackled glaze, and a second decoration, having no apparent connection with that beneath, is painted above the glaze. The colors of the Juchou, government (*Kuan*), Ko, Lung ch'üan and Chünchou porcelains were all some shade of what the Chinese call *ch'ing*. Now *ch'ing* means in some combinations blue, in others a pale dull green, as of the fresh olive, which is called by the Chinese *ch'ing-kuo*, the *ch'ing*-colored fruit. Pére d'Entrecolles, when writing of the Lung ch'üan ware, describes its color correctly as *teinte d'olive*. M. Julien, however, in spite of a hint given from the technical annotator M. Salvetat, which might have set him right, rejected this sense on what seemed to him sufficient grounds, and insisted on (erroneously) translating this word throughout his work as "blue," though by so doing he had to make his porcelain "as blue as (green) jade"—with the result that subsequent writers on this subject have failed to derive any assistance from his work in determining the origin and history of céladon porcelain. Hirth: *Op. cit.*, p. 7.

Céladon was originally the name of the hero in the popular novel *l'Astrée*, written by Honore d'Urfé in the seventeenth century. Céladon was attired in clothes of a kind of sea-green hue with gray or bluish tint, and his name thus came to be applied to the clothes he wore, precisely that designated by the Chinese as *ch'ing*.

* Julien: *Op. cit.* p. 63. Bushell: *Op. cit.* Nos. 19, 22, 34.

shades specially affected were, first, pale white like the moon, the French *clair de lune*; second, pale bluish green; and third, dark green; but during the Chingho period (1111 to 1117) the only color employed was bluish-green, both dark and pale in tint. This porcelain was very thin, and in some cases crackled all over so finely as to resemble crab's claws in shape, with the red brim and iron-colored foot distinctive of the true *céladon*. The *Po-wu-yao-lan*, quoted in the *T'ao-shuo* Treatise on Pottery (ch. 2, p. 9), explains this latter expression as follows:

As regards *Kuan-yao*, it should be known that the porcelain earth found at the foot of the *Fênghuang-shan*, or Phoenix hill, near Hangchou, is red; for this reason the foot (the base on which the vessel rests when being fired, and which is therefore not covered by the enamel), resembles iron in color. This was at the time called "red-mouthed and iron-footed." The term "red mouth" refers to the brim or opening of the vessel, which becomes red by the enamel flowing down and away from it, so as to be much thinner on the brim than it is on the body of the vessel, thus allowing spots of red paste to become visible.

Dr. Hirth, after quoting this explanation, adds:

The red or iron colored bottom, usually appearing in the shape of a ring, is a characteristic feature of the Lungch'üan *céladons*; but if the above explanation is correct, the bottom of Lungch'üan vessels differed from *Kuan-yao* bottoms, since the paste of Hangchou *céladons* (the southern *Kuan-yao*) is said to be red in itself, whereas that of the *Lungch'üan-yao* is originally white, and merely turns red in such parts of the surface as are not covered by the enamel.*

From Hsiang Tzŭ ching's catalogue it would seem as if there were originally two recognized classes of this ware: ordinary *Kuan-yao* and *Ta-kuan*, or superior *Kuan-yao*. Among the latter he mentions an ink-slab for the emperor's use, in which "an oval was left unglazed in the center for rubbing the ink on, showing the red paste." Both were *céladon* in color; in the superior variety (*ta-kuan*), however, the glaze appears to have been more brilliant—it is described as "clear and lustrous, like an emerald in tint." The two specimens of this ware described were both coarsely crackled. The ordinary *Kuan-yao* was in some cases crackled with a glaze varying from pale green to deep onion; in other specimens uncrackled, the latter being seemingly of a lighter tint than the crackled, the ornamentation, consisting of a variety of scroll designs or of some geometrical patterns broken by animals' heads in relief, was engraved under the glaze.†

After the court had been removed southwards to Hangchou, Shao Ch'êng-chang, superintendent of the Northern Imperial Park, is said to have established a factory in the residence of the junior director of the palace. Made of very pure clay, with great grace of form and covered with a transparent, brilliant glaze, this porcelain, which was termed *Nei-yao* porcelain of the palace or *Kuan-yao*—government porcelain—gained a high reputation.

* Hirth: *Op. cit.*, p. 20. † Bushell: *Op. cit.*, Nos. 2, 8, 5, 13, 15, 17, 47, 50, 53, 73.

TING-YAO.

Ting-yao, or porcelain of Tingchow, was manufactured originally in the district of that name in Chihli province, near the present department of Chênghing. It was known as *Pei-ting* or Northern Ting (960-1126), in contradistinction to the *Nan-ting* or Southern Ting, produced at Hangchow after the retreat of the court southwards before the advancing Mongols in 1127. The former was the more highly prized, and the finest specimens of this ware were those produced, it is said, during the period Chêngho (1111 to 1117) and Hsüanho (1119 to 1125). In color they were brilliant white, purple or black; and though the *Ko-ku-yao-lan* (a work treating of antiquities, completed in 1387), as quoted in the *T'ao-shuo*, or Treatise on Porcelain, from which the authors translated by M. Julien derive most of their information regarding the ceramics of earlier dynasties, gives as the test of Tingchow porcelain "the purity of its white color and brilliancy of its glaze," it is evident that the connoisseur Hsiang Tzŭ ching experienced a stronger affection for his "beautiful purple glaze, uniformly brilliant and transparent, resembling the tint of ripe grapes or of the anbergine (egg-plant)" and his black, than he did for the white glaze, though it were in his own words "uniformly lustrous and translucent, like mutton-fat or fine jade." Both the purple and black varieties were far rarer than the white. "I have seen," says the collector, "hundreds of specimens of the white, scores of purple-brown, but the black is extremely rare, and I have only seen the one specimen I have described in my whole life"—and he then had at least one of his specimens more than fifty years. It is, I think, in this rarity of the purple and black glazes that the explanation of the dictum above quoted is to be found, and probably they were unknown to its authors. The varieties mentioned in the *Ko-ku-yao-lan* as inferior to the white do not include these colors, and seem to result from impure clay or defective glaze.

The same work (the *Ku-ku-yao-lan*) says that one of the signs of the genuineness of this ware was the presence of marks on it like tears. This probably means granulations, for it is explained that these marks were caused by the manner in which the enamel was thrown upon the white paste. Specimens having ornamental designs engraved in the paste were the best, though the plain or unornamented were also highly esteemed; the second-class consisted of such as had the ornamentation worked into the enamel, and a third of such as had the decoration printed or pressed upon them with a mold, the ornaments chiefly used being the Chinese peony or *Pæonia moutan*, the *hsüan-ts'ao* or *Hemerocallis fulva*, and the flying *fénghuang* (Phoenix). In Hsiang Tzu-ching's catalogue, however, eleven specimens, all undoubtedly of the finest quality—six of the white glaze, four of the purple, and one of the black—are described, into the ornamentation of no one of which enters either of these so-called "usual" patterns; the decoration in every case,

is in general character exactly similar to that found on the Juchou ware already described.

Tingchow ware was well imitated during the Yüan dynasty (1260 to 1367) by one P'eng Chiün-pao at Hochou, in Kiangnan province, and later on very successfully at Chingtê-chên.* His productions, known as P'êng porcelain, after himself, and Ho porcelain, from the locality, are described as "fine in paste and white in color, looking very much like real *Ting-yao*."

LUNGCH'ÜAN.

Lungch'üan yao (Lungch'üan porcelain) was manufactured from the early part of the Sung dynasty (end of tenth or beginning of eleventh century) in the district of that name, situated in the department of Ch'üchou, Chehkiang province. The ornamentation was engraved under the glaze, which was of various shades from the color of grass to deep onion-green, sometimes crackled and sometimes not crackled; and occasionally bands of foliate or scroll pattern are found of deeper tone than the rest of the vessel. The biscuit, which was of fine clay, turned brown when the absence of glaze had exposed it to the effect of heat during baking, though when covered by the glaze and in fractures it remained white, and on the base or foot was a ferruginous ring. The specimens which survive are mostly coarse and thick, but as the best specimens were considered but little inferior to *Kuan-yao*, these probably represent only the rougher and inferior grades. In the designs no little artistic merit is shown at times. One specimen which is described by Hsiang Tzŭ-ching (and I have myself seen one exactly similar) consists of a whorl of palm-leaves surrounding a hollow stem to hold flowers. Another is "a sacrificial urn moulded in the form of a hornless rhinoceros, the body hollowed out to hold wine, with a peaked saddle on the back as cover, after a bronze design from the *Po-ku-t'u* "encyclopædia." The author translated by M. Julien states that this ware was subsequently successfully imitated at Chingtê-chên, and that the latter surpassed the originals in beauty. Dr. Hirth, however, avers on the authority of native connoisseurs that the pure Lungch'üan products can be distinguished from all imitations; first, because it is a peculiarity of the clay used in the manufacture of the former alone to turn brown or red on the surface when left exposed during baking, while the biscuit remains white where covered; and, secondly, because, owing to this peculiarity of the clay, the ferruginous ring on articles of white porcelain manufactured elsewhere can only be produced by artificially coloring the foot or base; an act which of course admits of ready detection on the part of an experienced collector.†

* Julien: *Op. cit.*, pp. 21, 61. Hirth: *Op. cit.*, pp. 13 *et seq.*

† Julien: *Op. cit.*, p. 69. Hirth: *Op. cit.*, pp. 31 *et seq.* Rushell: *Op. cit.*, Nos. 12, 16, 23, 25-27, 29, 32, 36, 67, 77.

KO-YAO OR CHANG-YAO.

Subsequently, after the removal of the court southwards in 1127, according to an authority quoted in the Topography of the Chehkiang province, the brothers Chang, natives of Ch'üichow, but having their factory in the Lungch'üan district, gained a high reputation for their porcelain. These brothers are known as Shêng-i, the elder-born, and Shêng-êrh, the second-born. The produce of the former's kiln was called *Ko-yao*, or elder-brother's porcelain, to distinguish it from that manufactured by the younger Chang, which was termed *Chang-yao* or *Chang Lungch'üan yao*, i. e., Lungch'üan porcelain made by Chang (the younger). Both are celadon in color, though the elder brother's ware appears to have been lighter in tint, and both have the distinctive marks of celadon, the red mouth or opening and ferruginous ring on the foot. The main difference between the two seems to have been that the *Ko-yao* was crackled—so closely in the best specimens as to resemble the fishroe—whereas the *Chang-yao* was uncrackled. In other respects the descriptions are curiously conflicting. The history of the Ching-tê-chên factory states that *Ko-yao* was extremely thin, while the *Wu-ts'a-tsu*, a work of the Ming dynasty, speaks of it as the one kind of porcelain of this epoch "of which it is not too difficult to obtain specimens, owing to its peculiar heaviness, which enables it to last long." As compared with the more ancient porcelain of Lungch'üan, the productions of the two Chang are described as "smaller, more graceful in shape, and showing greater delicacy of workmanship."*

CHUN-YAO.

The *Chun-yao* was a porcelain made from the early part of the Sung dynasty, in the district of Chünchou or sometimes wrongly corresponding to the present district of Yü-chow, in the department of K'aifêng, Honan province. It was sometimes molded in grotesque forms (*e. g.*, a lamp formed of a hornless dragon with scaly body and four short legs, the serpent-like head protruding with mouth open to receive the wick and body hollowed into a receptacle for oil), but was usually modelled after ancient bronzes and ornamented with scroll or floral patterns under the glaze, which, according to Hsiang Tzüiching, was either vermilion-red or aubergine purple—the two most valuable colors—moonlight white (*clair de lune*) or pale green, and sometimes marked with granulations. The authorities quoted in the *T'ao-shuo*, or Treatise on Pottery, would lead one to believe that the best pieces had two or more colors of glaze on the same vase. The higher quality, according to them, consisted of pieces having a color red like cinnabar and green like onion-leaves and kingfisher's feathers, which is commonly called parrot-green, and aubergine purple, or of pieces red like rouge, green like onion-leaves

* Julien: *Op. cit.*, pp. xxvi, 70. Hirth: *Op. cit.*, pp. 31 *et seq.* Bushell: *Op. cit.*, No. 11.

and kingfisher's feathers, and purple like ink; these three colors being intact and unchanged by baking. M. Julien enumerates seven varieties: (1) green or blue like plums; (2) purple-brown like the aubergine; (3) red like the *Pyrus japonica*; (4) pig's liver; (5) mule's lungs; (6) mucus; (7) sky-blue. But such differentiation appears erroneous, for the Treatise on Pottery says:

Pieces that have one or two numbers on the bottom as a trade mark, and are of a color resembling pig's liver—since the red, *ch'ing* (céladon), and green colors got mixed together like salvai hanging down through not being sufficiently fired—are not to be distinguished as different kinds. For such names as mucus or pig's liver, which are given to this class of porcelain, have been invented for fun's sake. Among these porcelains those which have bottoms like the flower-pots in which sword-grass is grown are considered the most excellent; the others, viz, those which have ton-shaped censers, Ho-fang jugs, or Kuan-tzü, are all of a yellowish sandy paste, for which reason they are not good in appearance.*

The same authority adds that none of these porcelains lasted long. Specimens are, however, I believe still to be found. Hsiang Tzü-ching, after describing a small jar, of globular form, with two boldly designed phoenixes molded in high relief as handles, interrupting a border of spirally ornamented medallions, adds:

Chiunchou porcelain is put at the bottom of the Sung potteries, yet a jar like this one, of elegant form, good color, and fine engraved work, equals, if not excels, as a flower-vase, one of Ju, Kuan, Ko, or Ting pottery. It is marked beneath with the numeral *wu*, five, an additional proof that it is really a Chün piece. †

TUNG-CH'ING-YAO.

Tung ch'ing-yao, or céladon porcelain, from the eastern capital, was produced at factories situated in the department of K'ai-fêng, Honan province, the so-called eastern capital of the Sung monarchs, before their retreat southwards, from 960 to 1126. It was of various shades of céladon, uncrackled (seemingly), with the ornamentation engraved under the glaze. The description given by Hsiang Tzü-ching of a small vessel of this ware will convey a truer idea of its character than the vague disquisition of the encyclopædists.

* The translation followed is Dr. Hirth's, but the sense is better brought out by Dr. Bushell's more correct rendering, which runs thus: "Among these porcelains the flower-pots and saucers for growing sword-grass are the most beautiful; the others, namely, the barrel seats, censers and boxes, square vases and jars with covers," etc. (North China Herald, 12th May, 1883.) The words here rendered, "the flower-pots and saucers for growing sword-grass" are translated by M. Julien "les plats sous le pied desquels on a peint un glaieul." This misconception of the meaning has, as Dr. Hirth points out, led astray all later writers on porcelain and its marks who have relied on Julien into describing the *acorus* as a mark, when found on the foot of a vessel, of its being a Kiun (Chün) piece of the finest quality. Dr. Hirth also draws attention to the fact that the expression *t'u-ssü wên*, translated by Julien when treating of one class of this porcelain as showing "veines imitant les soies (poils) du lièvre," really means showing veining like the *cuscuta* or dodder—*t'u-ssü* being the name of that plant.

† Bushell: *Op. cit.*, No. 20, 30, 41, 79. Julien: *Op. cit.*, pp. 74, 75. Hirth: *Op. cit.*, pp. 16, 17.

"It is of hexagonal form, with lobed border, decorated in panels, with formal sprays of flowers, plum blossoms, polyporus fungus, and grass, chrysanthemum, bamboo, etc., carved in relief under a glaze of bright green color like jade, raised in faint millet-like tubercles."*

LESS CELEBRATED VARIETIES.

In addition to the above celebrated productions of the Sung dynasty, the following less remarkable varieties may be mentioned:

The *Hsiao-yao*, from the Hsiao district, in the department of Hsiichou, Kiangnan province, extremely thin and brilliant, white in color, and very elegant in shape and workmanship.

The *Chichou-yao*, from the district of that name, corresponding with the present Luling district, in the department of Chi-an, Kiangnan province, both white and violet, the latter closely resembling the violet porcelain of Tingchow. The best was made by the family Shu; that produced by the daughter Shu Chiao realizing almost as much as *Ko-yao* (the elder Chang's porcelain). Her large vases for holding flowers would fetch several ounces of silver each. Regarding the violet variety, the technical annotator of M. Julien's work adds the following note: "Il est probable que ces porcelaines violettes étaient fabriquées à l'état de biscuit, et colorées ensuite avec un émail plombé coloré par le manganèse. Cette considération reporterait à l'année 960 de notre ère les glaçures plombifères; ce n'est qu'en 1283 qu'un potier de Schelestadt trouva le procédé de vernir la poterie au moyen du plomb, et put créer une fabrication véritablement industrielle."

The *Hsiuchou-yao* and *Ssouchou-yao*, from the districts respectively of the same name in the Kiangnan province. They resembled the (white?) Tingchow porcelain, but were far inferior in quality.

The *T'ang-yi-yao* and *Téngchou-yao* manufactured in the T'ang Téngchou districts of the department of Nayang, Honan province—both céladon, but, like the next, inferior to Juchou ware.

The *Yaochou-yao*, from the district of that name in the department of Hsi-an, Shansi province. They were originally céladon, but vases of white porcelain, possessed of considerable merit, but lacking in grace and strength, were subsequently produced.

The *Wuni-yao*, from the department of Chienning, Fukien province—a céladon made from black coarse clay, lacking in polish and with dry looking glaze.

The *Chien-yao*, from the department of Chienchou, the present district of Chienyang, in the department of Chienning, Fukien province—thin, of pale black color and of high polish, it was highly esteemed; some specimens were studded with granulations resembling drops or yellow pearls.

* Julien: *Op. cit.*, pp. 67-69. Bushell: *Op. cit.*, No. 79.

The *Yühang-yao*, from the Yühang district, in the department of Hang-chou, Chehkiang province—a kind of céladon, resembling *Kuan-yao*, but inferior, possessing neither the same crackle nor brilliancy.

The *Lishui-yao*, from Lishui district, in the department of Ch'üichou, Chehkiang province—heavy and thick, resembling in color the Lungch'üan (*i. e.*, céladon) ware, but far inferior to it.*

YUAN DYNASTY, 1260 TO 1349.

Under the Mongol dynasty, the Yüan (1260 to 1349), the manufacture of porcelain generally appears to have retrograded. Exceptions, however, must at least be made in favor of that produced for the special use of the emperor. This ware—to judge from the specimens described by Hsiang Tzŭ-ching—was white in color, with the ornamentation faintly engraved in the paste. Plates, bowls, etc., are said to have borne the characters *shu-fu*, “the palace,” inscribed on the interior on the foot. Hsiang Tzŭ-ching† states that this *shu-fu* porcelain was copied from the Tingchow ware of the Northern Sung dynasty, and the vase in his own collection he considers altogether like a Ting piece in its form, in the color of the paste and in the engraved design.

The details given by native writers regarding the productions of this period are scanty in the extreme. They mention, however, that at Lungch'üan céladons were produced on the model of the Chang ware, but the clay used was coarse and dry, and failed to give the fine color which had characterized the older productions.

At Ho-chou, in the Kiangnan province, P'êng Chün-pao produced, as already stated, some excellent porcelain, known as New *Ting-yao* and from the name of the district in which it was produced, *Ho-yao* or ware of Ho, and closely resembling the older ware from Tingchow. Made from fine, white, plastic clay, it was very thin and céladon in color. Other varieties mentioned are:

The *Hsüanchou-yao*, from the department of that name in Kaingnan province, very thin and white in color.

The *Linch'uan-yao*, from the district of that name in the department of Fuchou, Kiangsi province, was a porcelain made from soft white clay. It was thin, and generally white, with a light yellow tinge; but some bore flowers coarsely painted.

The *Nanfêng-yao*, from the district of that name in the department of Chienchang, Kiangsi province, was a somewhat thick porcelain, in many cases ornamented with flowers in blue. These two latter kinds appear to have been very famous under the Yüan dynasty, and to have been much preferred to the productions of Chingtê-chên.

The *Hut'ien-yao*, manufactured in the neighborhood of Chingtê-chên, was either a yellowish-black, or, if white, had a tint of that color. ‡

* Julien: *Op. cit.*, pp. 12-21.

† Julien: *Op. cit.*, pp. 23, 24, 86.

‡ Bushell: *Op. cit.*, No. 21.

No specimens of these wares have, however, so far as I am aware, survived to the present day, and among those which Chinese connoisseurs now declare to be red products of the Yüan dynasty one seldom sees any but such as are of a uniform whitish-purple with deep red splashes.

MING DYNASTY, 1368 TO 1649.

Under the Ming dynasty the ceramic art made great progress, both in the fineness of the ware and in the excellence of the decorative workmanship. It would appear that under the Yüan dynasty imperial orders were not invariably executed at the government factories, but were frequently entrusted to private enterprise. None, however, of the articles tendered was accepted unless considered perfect, and the test was so severe, that as much as 90 per cent. was at times rejected. Under the Ming dynasty, however, the manufacture appears to have been more and more restricted to the Chingtê-chên factories, which thenceforward practically monopolized the production of artistic porcelain. The administration was reformed, and officers were despatched from the capital with the orders, the execution of which they had to superintend, and on completion to deliver to the palace—duties which, like most others of emolument and dignity, were absorbed by eunuchs during the reigns of the last emperors of that dynasty.

In their paintings, which are always in water color, the Chinese, while of course requiring on the artist's part a knowledge of the technique adequate to a proper treatment of the subject chosen, admire chiefly a boldness of stroke which proves complete mastery over the pencil, and a facility of conception which permits of improvisation, so to speak; that is, of the elaboration of the original design *currente calamo*, and without having previously outlined a sketch of it upon the object to be decorated. This style of painting is termed *pi-i*, "following the will of the brush." An artist who first sketches out his design and then carefully and elaborately fills in the details, a style which is depreciatingly termed *kung-i*, "mechanical", occupies in their estimation a very subordinate position. And the characteristics of the two styles are so clearly defined, or at least are so patent to the practised native eye, that a single glance almost suffices to enable a connoisseur to determine to which of the two a painting belongs.

In a country, too, where painting as a profession does not exist, and where the interchange of fans or scrolls painted by the donors, as one of the most ordinary forms of courtesy, generates, if not a profound knowledge of the art, at least a very general practical proficiency in it, it has resulted that the most noted artists are to be found among the class enjoying the most leisure—that formed of the successful competitors in the literary examinations which constitute the one entry to official employment. In this way the more highly esteemed style of painting, with its bold free stroke, came to be considered (as indeed it prac-

tically was) the almost exclusive production of the literary or official class. Hence when, during the Ch'ênghua period, the decoration of porcelain in many colors came to be that most highly prized, it became customary to have the designs drawn by the most celebrated artists among the palace officials and to transmit them to the manufactory to be there executed by the most skilled painters.

Owing to the care thus exercised in obtaining decorative designs from the brushes of the best artists and in having them executed by the most able workmen, the manufacture reached a higher point of excellence during this (the Ch'ênghua) period than at any other time during the Ming dynasty, and the steps of development which led to this result may be distinctly traced.

As has been remarked earlier, decoration by painting in colors as distinct from the general coloring imparted by glaze is, I believe, first reached under the Ming dynasty. In the Yunglo period (1403 to 1424) it took the form of decoration in blue under the glaze. Special attention was paid to this style during the Hsüantê period (1426 to 1435), and owing probably to the adoption of a special kind of foreign blue (known in Chinese as *Su-ni-po*, which appears to have been obtainable during this period alone), a brilliancy of color was attained which was never afterwards quite equaled. At the same time, however, a brilliant red color attracted universal admiration. At first this was used by itself either as a uniform coloring over the outside of bowls and cups, or for the delineation of fishes or peaches upon the white ground, the contrast of the two colors, both striking in brilliancy, being highly admired. Then a form was adopted which, while it gave due prominence to the highly prized crimson, admitted of the introduction of other colors in a subordinate capacity, such as vessels in the shape of persimmons (*Diospyros kaki*) on a leafy branch forming the handle, the fruit being red, and the leaves and stalk of their natural colors, green of various shades and brown respectively. From this form of decoration it required but a step to reach the use of the enamel colors for which the Ch'ênghua period (1465 to 1487) is famous.

The use of enamel colors continued during the Hungchih period (1488 to 1505), some of the specimens being scarcely inferior to the best pieces of Ch'ênghua ware, but gradually gave way in public favor to a pale yellow glaze covering an ornamentation engraved in the paste. This was also the most highly esteemed production of the Ch'êngtê period (1506 to 1521): though the efforts to obtain further supplies of blue from the west being crowned with success, a revival in favor of "blue and white" china took place during this and especially the following reign till the supply was once more exhausted.

Peculation, misgovernment and its attendant disorders and an increasing difficulty in finding the finer qualities of clay combined to cause a steady decline from this period onwards in the artistic excellence of the porcelain produced. The rapidity of the downward course was con-

siderably accelerated by the enormous extent of the imperial orders for the supply of the palace, which, sometimes aggregating 100,000 pairs of articles on a single occasion, taxed the resources of the government factories beyond their strength, with the result that, in order to economize money and labor, colors which were expensive or difficult to procure, were replaced by others less costly and more simple in their ingredients, and artistic beauty and excellence of workmanship were sacrificed to promptness in providing the supplies ordered. It is the gradual dispersion of the articles comprised in the vast orders issued during the Lungch'ing (1567 to 1572) and Wanli (1573 to 1619) periods that has provided the bulk of the specimens in the possession of modern collectors of what has come to be considered (though in view of the much higher artistic merit of the ware produced under earlier emperors very unfairly considered) the characteristic Ming porcelain, porcelain somewhat coarse in make, faulty in shape, and decorated with paintings which, though characterized by boldness of design, are usually marked by want of care in execution.

While, however, the work of the government factories showed these unmistakable signs of decadence, strenuous efforts were made by a few isolated private manufacturers to raise the art to its earlier level of excellence. The imitations by Chou Tan-ch'ian of the beautiful old Tingchou ware, and the cups of Hao Shih-chi of a "dewy-dawn red" and of egg-shell (the latter at times only weighing one-fortieth of an ounce apiece) are spoken of in terms of the highest admiration, and brought fabulous prices. But though these efforts were, if the statements of Chinese writers can be relied upon, crowned with complete success so far as the artist's individual productions were concerned, they were inadequate to prevent the downward tendency exerted by the government establishments at Chingtê-chên, which had already for a long while almost monopolized the production of porcelain in China.

During the remainder of the period that the Ming dynasty held the throne its energies were so much occupied in endeavoring to suppress internal disorder and in resisting the attacks of the Manchu Tartars on its northern frontiers that no attention was paid to the ceramic art.

FROM 1403 TO 1424.

During the Yunglo period (1403 to 1424) much white porcelain, with ornamentation in blue under the glaze, commonly known in Europe as "blue and white china," was manufactured, which holds third place in regard to excellence among this class of ware produced during the Ming dynasty, that of the Hsüantê period (1426 to 1435) occupying the first, and that of the Ch'enghua period (1465 to 1487) the second place. The blue employed is stated in the annals of Fouliang to have been brought from some Mohammedan country as tribute, and was thence known as Mohammedan blue. During the Yunglo and Hsüantê periods

it was termed *Su-ma-li* or *Su-ma-ni* blue, and during the latter *Su-ni-po* also. Where this blue came from and whether these Chinese designations are the reproductions of the name of a country or of a color has never been determined. Dr. Hirth, while pointing out the resemblance of the former in sound to smalt (mediaeval Latin *smaltum*), and of the latter to Schneeberg, "under which name the Saxon blue afterwards became famous all over the world,"* thinks a search into Arabian or Persian records of that day may yet supply the missing explanation. What ever it was, the supply was exhausted during the Ch'ênghua period. Somewhat later, however (during the Chêngtê period (1506 to 1521), Tatang, the governor of Yünnan province, succeeded in obtaining further supplies of Mohammedan blue by paying for it twice its weight in gold; and during this and the greater part of the subsequent reign (Chiaching period, 1522 to 1566) it continued available; a fact to which is doubtless attributable the excellent color of the productions of that time. Towards the close of the latter reign, however, the supply again gave out, when an incinerated cobaltiferous ore of manganese (termed *wu-ming-i*) replaced the western product; the color obtained from this native ore, far from equalling the brightness and transparency of the foreign blue, however, showed a dull and heavy tint after baking.

EGG-SHELL PORCELAIN.

Egg-shell porcelain of very delicate workmanship was produced, but owing to its extreme fragility good specimens are now very difficult to obtain. It appears also to have had a tendency to crack during the process of firing. These porcelains are termed among the Chinese *t'o-t'ai*, or porcelain from which the "embryo" or biscuit has been removed, and are divided into two classes: "True *t'o-t'ai*," the very thin, also known as egg-shell (*tan-p'i* or *luan-mu*) and "semi *t'o-t'ai*," the somewhat thicker. The true *t'o-t'ai* especially present great difficulties in the manufacture and require extraordinary dexterity in the handling, for so thin is the portion of the body the workman allows to remain, that it seems as though all had been removed; and it is only quite recently that the government manufactory at Sèvres has succeeded in producing such porcelain, and then by an entirely different process, by casting or *moulage en barbotine*.

The work translated by M. Julien states that while the production of this ware originated during the Yunglo period it was only the thicker variety that was then made, and that the true *t'o-t'ai* dates from a later epoch, having been produced during the Ch'ênghua period (1465 to 1487) at the government manufactory and during the Lungch'ing (1567 to 1572) and Wanli (1573 to 1619) periods at private factories. This statement appears, however, to be erroneous; for in No. 295 of this collection will be found a specimen, so at least Chinese experts state, of the semi *t'o-t'ai*

* Hirth: *Op. cit.*, p. 65.

(though it seems difficult to believe that a bowl of such size could be made much thinner and yet be of practical utility), and in Nos. 289 to 294 specimens of the true *t'o-t'ai*, both having the inscription *Yung-lo-nien-chih* "Made during the Yunglo period" engraved in the old seal character on its foot. Moreover, the one specimen of this ware described by Hsiang Tzū-ching is a small cup "as thin as paper, called *t'o-t'ai*, body-less," i. e., true *t'o-t'ai*, not semi *t'o-t'ai*, of which he says "there are not a few of these wine-cups left, yet they are highly appreciated by collectors of taste.* Specimens of the Ch'ênghua egg-shell will be found in Nos. 296 to 303.

In spite of the extreme thinness of this ware many specimens—such as Nos. 289 to 294, already referred to—are adorned with very elaborate designs engraved under the glaze (an operation requiring exceptional delicacy of workmanship), which are scarcely visible unless the vessel be held against the light or be filled with liquid. These specimens possess additional interest from the fact that they enable us to picture to ourselves what the porcelain manufactured for the special use of the palace under the Yüan dynasty (the *Shu-fu*) and the Tingchou ware of the Sung dynasty were like; though, of course, these latter had not the thinness and delicacy of the egg-shell porcelain. For Hsiang Tzū-ching, after describing a specimen of *Shu-fu* porcelain decorated with dragons in the midst of clouds and with lion's head handles, all faintly engraved in the paste under a white glaze, states that "the porcelain of our own dynasty (the Ming) of the reigns of Yunglo and Hsüantê, decorated with patterns engraved under a white glaze, was made after this *Shu-fu* porcelain, which was itself copied from the Tingchou porcelain of the northern Sung dynasty.†

FROM 1426 TO 1435.

Among the porcelain manufactured during the Hsüantê period (1426 to 1435) that covered with crimson glaze or bearing designs in that color holds the highest place in the eyes of Chinese connoisseurs. "It truly stands pre-eminent among the celebrated porcelains of different dynasties, a precious jewel of our own times," says Hsiang Tzū-ching. Some of the descriptions left by this author are worth reproducing. (1) An incense burner from an old bronze design. "The upper two-thirds of the body and the handles, which are moulded in the form of fish, are covered with a deep red glaze of rosy dawn tint, the lower part enameled white, pure as driven snow, the two colors mingling in a curved line, dazzling the eyes." (2) A wine pot (6½ inches high), copied from a similar vessel of carved jade used by the emperor. The body, slender below, swelling towards the top, is decorated with engraved cloud scrolls and bands of geometrical and spiral pattern, with conical cover, spirally curved handle, and spout moulded and engraved in the form of a phoenix head, all covered with deep-red (*chi hung*) glaze." It

* Bushell: *Op. cit.*, No. 61.

† *Ibid.*, No. 21.

is said to have cost the owner 200 ingots of silver in paper notes, a sum Dr. Bushell estimates to be equivalent to about £600.

Another style of decoration much esteemed at the time for open vessels was "three red fish on a white ground pure as driven snow, the fish boldly outlined and red as fresh blood, of a brilliant red color dazzling the eyes." Occasionally these fish would be represented on the outside swimming on waves engraved in the paste, with two more on the inside. Though no less than four vessels so decorated are described by Hsiang Tzū-ching, they are stated to have been even then "precious specimens of this rare kind of porcelain"—they are certainly so now.

A rarer kind of decoration still was three pairs of peaches in red on a white ground—of these "only two or three were then known to exist within the four seas," *i. e.*, the empire.

A still rarer decoration, found on a wine-cup, is described as "the white ground decorated inside and outside with cloud scrolls engraved in the paste, a scroll border above colored crimson: the handle a dragon of bold design moulded in high relief coiled round the top, with teeth and four claws fixed in the rim, enamelled vermilion red." (Vessels with a dragon moulded in relief upon the brim are, it may be added, always highly esteemed by the Chinese when intact, partly because of the artistic ability required to successfully execute the design, and partly because old specimens are seldom met with undamaged.) "Only one or two of these beautiful little cups remain throughout the empire, and 100 taels (\$150 gold) is not considered too much to pay for a specimen." Hsiang Tzū-ching states that the brilliancy of this crimson glaze was obtained by the addition of powdered red gems from the west to the ordinary materials. Dr. Bushell, commenting upon this statement, says "this is impossible, and the colors being painted on under the glaze shows it to have been a copper silicate, the same doubtless that gave the bright red (*hsien hung*) to the monochromes of the period.* M. Julien states that among the colors for porcelain painting brought from China by M. Itier (an employé in the ministry of finance, who accompanied the French ambassador to that country) and presented in 1844 to the manufactory at Sèvres, was one named *pao-shih-hung*, "precious stone red", which when analyzed by M. Salvétat proved to be merely "oxyde de fer avec du fondant."†

A decoration first met with in the productions of this period is obtained by the entire excision of a delicate pattern, by some sharp instrument, from the biscuit of which the cup or bowl is formed. When the vessel is dipped in the glaze, the latter fills up the excised open work with a thin film sufficiently thick after baking to retain the liquid in the cup, though so thin that the pattern is thrown out as a transparency upon the more opaque body. This decoration is commonly known among English collectors as "lace-work," and the French term *pieces* so decorated *reticulées*.

* Bushell: *Op. cit.*, Nos. 6, 10, 40, 54, 56, 58, 60, 69, 71, and p. 117,

† Julien: *Op. cit.*, p. 91,

FROM 1465 TO 1487.

During the Ch'ênghua period (1465 to 1487) the production of porcelain bearing a blue decoration under the glaze continued, but owing chiefly to the fact that the supply of *Su-ni-po* blue from abroad was exhausted and partly from the growing preference for ornamentation in enamel colors, this ware was inferior in color to that of the Hsüantê period; and it is for the decoration in enamel colors that this period is chiefly and justly famous.

One authority states that among the productions of this period are the most beautiful of wine-cups, the upper part of which is adorned with a Chinese peony (*Pæonia moutan*) and having at the base a hen and chickens full of life and movement.* Hsiang Tzŭching thus describes a pair:

They are of rounded form, swelling below, so thin and delicate that one weighs less than a third of an ounce. The cockcombs, narcissus and other flowers, the flying dragon-fly and crawling mantis, painted after life, in green, yellow, and crimson enamel. These are choice specimens of the wine-cups of this celebrated reign, and are valued at 100 taels (say \$150) the pair, yet now even for this money it is impossible to get them.†

Another miniature wine-cup described by him is said to have been purchased for 60 ounces of silver (\$90), while a pair in the possession of one of the high officers of the court under the Emperor Wanli is stated by another writer to have been valued at 1,000 ounces, or \$1,500. Whatever may be thought of the last statement, the prices mentioned by Hsiang Tzŭching are fully confirmed by contemporary writers. The Treatise on Pottery (the *T'ao-shuo*) quotes from a work written towards the end of the Ming dynasty as follows:

On the days of new moon and of full moon I often went, while at the capital, to the fair at the Buddhist temple Tz'ŭ-ên-ssŭ, where rich men thronged to look at the old porcelain bowls exhibited there. Plain white-cups of Wanli porcelain were several ounces of silver each, those with the marks of Hsüantê and Ch'ênghua were twice as much more, up to the tiny cups decorated with fighting cocks, which could not be bought for less than a hundred ounces of the purest silver, pottery being valued far more highly than precious jade.‡

From the time of the Emperor Wanli it was the endeavor of every man of taste, whose wealth could support such a strain, to set wine-cups of Ch'ênghua ware before his guests. Considering how many pieces of this choice porcelain must have been thus sacrificed, it is not surprising that it is almost impossible to procure specimens at the present day—nearly three hundred years after they were selling at twelve times their weight in gold—though Dr. Bushell states that “one may be occasionally seen in a Chinese collection preserved in an ebony box softly lined with padded silk.” Four specimens of these cups are contained in the collection—Nos. 300 to 303.

* Julien: *Op. cit.*, p. 94.‡ Quoted by Bushell: *Op. cit.*, p. 98.† Bushell: *Op. cit.*, No. 59.

From this period also are supposed to date many of the large vases which form so prominent a feature in the European collections, decorated with historical scenes, in the coloring of which green plays so large a part, and which have in consequence been termed by French writers "la famille verte." They are really, however, more modern. "The finest," as Dr. Bushell truly remarks, "belong to the reign of K'anghsi, so that one of a pair is often found with a Ming mark beneath, the other with a censer, flower, or other emblem (of the K'anghsi period); yet some connoisseurs pride themselves on being able to distinguish the genuine Ming in this class from the false, confessing, however, that it is a difficult matter.*

This period is also noted for its egg-shell porcelain. It was not, however, invented at this time, but, as we have already shown, first manufactured during the Yunglo period. The four small plates of this ware (Nos. 296 to 299) are worthy of special note, not only for their extreme thinness and transparency, but for the very unusual style of their decoration—landscapes in enamel colors above the glaze.

FROM 1488 TO 1505.

During the succeeding period, Hungchih, 1488 to 1505, while enamel colors were still used, a very pale yellow glaze of the color of a newly husked chestnut was the tint most highly prized, the two kinds of decoration being at times combined. If the uniform yellow glaze was employed, ornamentation would be at times engraved in the paste or moulded in relief beneath it. So little is said regarding the ware of this period by Chinese authors, that it is worth while recording the descriptions of two choice specimens given by Hsiang Tzŭ-ching—(1) a wine pot "moulded in the form of a gourd contracted in the middle, the brown stalk forming the handle of the cover, a winding branch the tapering handle, from which spring green tendrils and leaves and a miniature gourd, all worked in relief in the yellow body, a second miniature gourd being fashioned into the spout. Light yellow was the color most highly valued in this reign, but enamelling in color was also employed, as in this piece, which reminds one of the porcelain of the reign of Ch'ênghua;" (2) a teacup "in the form of a hibiscus flower, covered outside with a delicate yellow glaze imitating the natural tint of the flower; white inside. I have seen many specimens of Hungchih porcelain, but nothing to surpass these little cups."*

FROM 1506 TO 1521.

During the Chêngtê period (1506 to 1521), so far as the meagre details chronicled allow us to judge, while decoration in enamel colors continued and the successful endeavors of the governor of Yünnan to obtain further supplies of Mohammedan blue caused attention to be

* Bushell: *Op. cit.*, p. 99.

† *Ibid.*, Nos. 7, 42, 46, 66.

again turned to the production of porcelain ornamented with designs in blue under the glaze, the ware most highly prized was that covered with a yellow glaze, introduced under the previous reign, over patterns engraved in the paste, and a red monochrome termed *chi-hung*. This term appears to have included two shades, one the *pao-shih-hung*, or "precious-stone red" already discussed under the Hsiuantê period, (page 412), and the *hsien-hung*, a bright red, produced by a silicate of copper. This color, the Chinese records state, could not be successfully produced subsequent to this period under the Ming dynasty, owing seemingly to inability to maintain a suitable condition of atmosphere in the kiln; a difficulty explained by M. Salvetat thus:

Si l'atmosphère du four est trop réductrice, le cuivre passe à l'état de cuivre métallique; si l'atmosphère du four est trop oxydante, la coloration rouge disparaît et la couverte devient verdâtre (*Recueil des travaux scientifiques de M. Ebelmen*, Tome I, p. 437): le protoxyde de cuivre seul donne un silicate d'une couleur rouge.*

A curious kind of earthenware is mentioned by Hsiang Tzŭ-ching as having been produced in the Yi-hsing district, of the department of Changchou, Kiangsu province, by a celebrated potter named Kung Ch'un. Teapots of this ware were of a light brown-like felt, or covered with a vermilion red glaze. In either case the color is said to have changed to a bright green when tea was poured in, and to have gradually reverted to its original color, line by line, as the liquid was poured out. This curious peculiarity is said to have been merely the accidental result of some change effected by baking, but was highly prized by collectors—500 ounces of silver (\$750) having been paid for the two specimens described by our author.†

FROM 1522 TO 1566.

During the Chiaching period (1522 to 1566) the yellow glaze, so particularly affected during the two previous reigns, appears to have been entirely, and decoration in enamel colors to have been almost entirely, abandoned, the old style of ornamentation in blue under the glaze being chiefly admired, till the supply of that color from the west was again exhausted during the later years of this reign: and to the present day the "blue and white" of this period is much sought after by collectors. Apart from this, the only kind of ware at all remarkable mentioned by Chinese writers is cups intended for use upon the palace altars, and hence termed *t'an-chan*, which are said to have resembled white jade and to have been exceptionally beautiful. One maker, named Ts'ui, who is stated to have lived during this and the following reign, is however mentioned as a successful imitator of the porcelain of the Hsiuantê and Ch'ênghua periods, his productions being known as Ts'ui-kung *yao-tz'ŭ*, "Mr. Ts'ui's porcelain-ware."‡

* Julien: *Op. cit.* p. 97. Bushell: *Op. cit.*, Nos. 52, 78.

† Bushell: *Op. cit.*, Nos. 44, 45.

‡ Julien: *Op. cit.*, pp. 97, 100.

FROM 1567 TO 1619.

During the Lungch'ing (1567 to 1572) and Wanli (1573 to 1619) periods it appears to have been difficult to obtain supplies of good clay, and this fact, combined with the increasing disorder throughout the empire and the enormous extent of the supplies ordered for palace use, caused a marked deterioration in the quality of the ware produced, though the workmanship is at times highly spoken of, especially in the case of porcelain decorated in enamel colors—the most highly prized having marks on them resembling “millet grains,” or a surface marked as with the pittings on orange peel (*l'apparence chagrinée d'une peau d'orange*).

While, however, the productions of the government factories were marked by an ever-increasing decadence, serious efforts were made by private producers to stay the downward tendency, and two individuals would seem to have won for themselves and their ware a very high reputation. Chou Tan-ch'ian, a native of Wumên, imitated the ancient masterpieces of Tingchou porcelain so successfully, that the most expert connoisseurs failed, it is said, to detect the fraud, and willingly purchased them at such enormous sums as 1,000 ounces of silver each (\$1,500). Another maker, of unknown origin, but whose name tradition says was Hao Shihchiu, made cups of “liquid-dawn tint,” bright as vermilion, and of egg-shell of a beautiful brilliant white, and weighing in some cases only just over half a penny weight, or about one-fortieth of an ounce, for which extravagant prices were paid (this all sounds, however, much exaggerated). Other productions of his were celadon vases resembling *Kuan-yao* or the elder Chang's ware (*Ko-yao*), except that they were not crackled, and vases of a color which the French term *feuille morte*, or *fond laque*, a brown or coffee tint, derived from ferruginous clay. This artist was known as *Hu-kung*, “Mr. Pots,” or *Hu-yin-tao-jen*, “the Taoist hidden in a pot,” apparently pseudonyms adopted by him in allusion to an old legend preserved in the *Shên-hsien-chuan*, an ancient work on Taoist immortals, and signed his jars with the mark *Hu-yin-lao-jen*, “the old man hidden in the pot.” According to the legend, *Hu-kung*, the Old Man of the Pot, was a magician, endowed with marvellous powers of healing, who lived during the third and fourth centuries, and was accustomed to distribute in charity the vast sums he received in payment for his miraculous cures. He disappeared each night from mortal view, his retreat remaining a mystery till he was watched, when it was discovered that the leech was accustomed to withdraw at sunset to the interior of a hollow gourd which hung from a door-post. Julien translated these characters as *le vieillard ou qui vit dans le retraite*: but says Dr. Hirth “it seems to me that these four characters have rather an epigrammatic sense, and if translated into Latin would be among the most delicious of Martial's Apophoreta; for the ‘old man,’ as the clever maker styles himself, ‘is concealed in the pot,’ like the fairy

Hu-kung was in his, and although invisible, he himself—that is, his inventive genius—is contained in it. It impresses me as the most sympathetic device a ceramic artist could select as a mark.” *

PRESENT DYNASTY, 1644 to DATE.

The factories at Chingtê-chên, which had been closed during the last years of the Ming dynasty, were not re-opened till the Manchu emperors had firmly seated themselves upon the throne—during the reign of K'anghsi (A. D. 1662 to 1722). He and his two successors, Yungchêng (1723 to 1735) and Chienlung (1736 to 1795), while maintaining the qualities which had enabled their race to gain its high position, at once adopted the civilization of the conquered nation. No less eminent as scholars and statesmen than as able generals, loving the magnificent but no less aiming at practical utility, they set vigorously to work to reform those portions of the theoretically admirable system of government which had been allowed to fall into decay, to improve and beautify the capital and its palaces, to diffuse education and to encourage the fine arts. The factories at Chingtê-chên were not slow to feel the effects of this change of system. The kilns increased rapidly in number, till at the date of P. d'Entrecolles' letters, they aggregated over three hundred in full activity, the fires of which at night so illuminated the hills surrounding the plain in which the town stands, that it seemed as some vast city abandoned to the flames, and over a million souls found a means of livelihood in its busy streets. The production was not characterized by activity alone, however. The ablest artists were employed to paint and to design ornamentation, to enhance the beauty of which they at times availed themselves of foreign ideas; odes from the emperor's pen were reproduced upon vases in fac simile, or short extracts were introduced as subjects for illustration; vases and cups were specially ordered to confer upon distinguished personages, their achievements being epitomized in the paintings which decorated these precious heirlooms (No. 169); the workmen and decorative artists were educated to a higher level of proficiency; and the direction of the factories was confided to officers who were known to be possessed of the knowledge requisite for such a position. Progress was sure and rapid; and during the seventy-five years between 1698 and 1773—comprising roughly the latter half of K'anghsi's reign, the whole of Yungchêng's and rather more than half that of Chienlung—the manufacture and decoration of porcelain in China attained a degree of excellence which in my opinion has never been reached either before or since.

During the early part of K'anghsi's reign (1662 to 1722) green was, as it had been among the later productions of the Ming dynasty—during the Lunching and Wanli periods of 1567 to 1619—the predominating color employed in decoration, such porcelain being hence termed *la*

*Hirth: *Op cit.*, p. 72. Julien: *Op cit.* pp. 99, 103, 104, 206.

famille verte; and to this period belongs, in part, much of the ware so decorated, which is usually ascribed to the earlier dynasty and is considered a characteristic Ming porcelain. To the colors applied under the glaze was now added a blue above glaze, which does not seem to have been known under the Mings. During the later years of this reign, however, green gave way to red as the predominating color, and a style of decoration was adopted which has been classed by M. Jacquemart and subsequent writers under the title of *la famille rose*. It is easily distinguished by its half tints and broken colors, having for decorative basis a carmine red lowered to pale rose, and obtained from gold, which is called in Europe purple of Cassius. The addition to their palette of this color, of yellow derived from antimony and of white from arsenical acid, enabled Chinese artists to considerably increase the variety and beauty of their decorations. A director of the government factories named Ts'ang Ying-hsüan, is mentioned by Chinese writers as having about this time gained considerable distinction by his productions, which were of thin porcelain, covered with a brilliant, and, in the most highly valued specimens monochrome, glaze. The colors are stated to have been "snake-skin green," "mud-eel yellow," blue, and dappled yellow. Other, but less esteemed, colors were pale yellow, pale violet, pale green, and blue or red, both *soufflé*.

FROM 1723 TO 1796.

Shortly after the accession of Yungchéng, Nien Hsi-yao was, in 1727, entrusted with the direction of the imperial manufactories. He personally selected the materials and superintended the execution of the emperor's orders. All the articles made by him—which are known as Nien porcelain, *nien yao*, were graceful in form and of fine workmanship. They were chiefly monochrome in color, blue, bright and carmine reds, céladons, and "of egg-color as bright as silver," but some were ornamented with painted flowers, either incised or plain. Some of the monochrome vases, dating from this or a slightly later period, have lately obtained an extraordinary vogue among the foreign collectors, and bring prices ridiculously above any value to which they could justly lay claim on the score of either rarity, color or workmanship. A small vase only 8 inches high, of a dull white-pink shade upon an underground of pale sea-green, which has been dignified by the name of "peach-blow" (in some specimens this underground forces itself into notice in the form of splotches on the pink), was offered to the writer in Peking for less than \$200 gold, and, having been purchased by a foreign dealer, was eventually sold in New York for \$15,000. With Nien Hsi-yao was associated in the management a year later a Manchu officer in the lord chamberlain's office named T'angying, who fifteen years later succeeded to the sole direction. Possessing an intimate knowledge of the different varieties of clay and of the effects of the fire upon them and on colors, he exercised the greatest care in the

choice of materials, and every article made under his orders was remarkable for delicacy of workmanship, purity of form, and brilliance of coloring. He imitated with wonderful precision the most beautiful of the ancient designs, and his efforts at reproducing the most celebrated glazes were crowned with equal success. In addition he is credited with the invention of several new styles of decoration, of which the most remarkable were: The use of European blues and violets, a ground of enamel black, white flowers or designs in gold upon a black ground, the French method of painting, and the *yao-pien* or *flambé* style. In a word, "under his direction," Chinese writers state, "the products of the imperial factories attained their highest perfection.*"

The work translated by M. Julien distinctly states that the introduction of the black grounds dates from the early part of Chienlung's reign. Treating, as this work does, of events of such comparatively recent occurrence, its reliability would at first glance seem scarcely open to doubt. I am, however, strongly of opinion that the statement is erroneous, and that black grounds originated some decades earlier. I have seen specimens which, the black ground apart, have all the characteristics of the K'anghsi period, and far inferior in delicacy of execution to specimens which were undoubtedly manufactured under the direction of T'angying, such as No. 93 of this collection. The accuracy of the statement in other respects is, however, confirmed by experience. The use of violet, or of magenta with a violet tone, with most happy effect, especially for grounds, is one of the characteristics of this period, while the best blues fully equal anything in that color produced during the best periods of the Mings.

Special attention, as has been seen, was also paid at this time to the production of *yao-pien*, of which Chinese writers distinguish three kinds, two due to celestial agency; one, the *flambé* glaze, to human ingenuity. As regards the latter, oxydulated copper, it is well known, furnishes vitrifiable painting with a fine red. This, thrown in a body on a vase, forms the tint called *haricot*, a kind of fawn color; with a further quantity of oxygen of equal amount a protoxyde is formed, producing a beautiful green, that may be changed into sky-blue by increasing the oxygenation. The tints upon a vase may thus be modified almost indefinitely by a due regulation at different periods during the process of baking of the currents of air admitted. "When a clear fire placed in a strong current draws a considerable column of air, all the oxygen is not consumed, and part of it combines with the metal; if, on the other hand, thick smoke is introduced into the furnace, of which the carbonaceous mass, greedy of oxygen, absorbs everywhere this gas, necessary for its combustion, the oxydes will be destroyed and the metal completely restored. Placed at a given moment in these given conditions, by the rapid and simultaneous introduction of currents of air and of sooty vapors the *haricot* glaze assumes a most picturesque appearance; the

* Julien: *Op. cit.*, pp. 108 *et. se.*

whole surface of the piece becomes diapered with veins and streaked colorations, changing and capricious as the flame of spirits, the red oxydulate, passing by violet into pale blue and to the green protoxyde, evaporates itself even completely upon certain projections, which become white, and thus furnishes happy accidental combinations.* The supernatural changes are either of color, as when a piece of porcelain is taken from the kiln having developed a patch of some new color in a natural shape, or of form, "as when some unusually large slabs were requisitioned by one of the Ming emperors, which were transformed into beds and boats, with equipage complete, and forthwith broken up by the startled potters, as gravely reported by the official in charge by way of excuse for their absence."† In the Buddhist temple Pao-kuo-ssü in Peking is a famous *yao-pien* image of Yüanyin, a finely designed figure enamelled in colors, light blue, crimson, yellow, and two shades of brown; of which, from an ode from his pen engraved on the shrine, the Emperor Chienlung says the goddess descended into the kiln to fashion an exact likeness of herself.

The reference to the introduction to "the French method of painting" is of so interesting a nature as to merit more detailed consideration.

The Jesuit missionaries of the seventeenth century gained for themselves a position of dignity and influence beside the Dragon throne such as no foreigner before or since has succeeded in attaining. This position, and a tolerance which saw nothing incompatible with the Catholic religion in the cherished observance of the Chinese—in the payment of official honors to the sage Confucius and in the worship of ancestors—caused a remarkable spread of Catholicism, which, owing to the labors of Father Ricci and his successors, had already established itself under the Ming dynasty, counting among its members many officials and the consort of the last of the line, who proclaimed himself emperor in the Kwangtung (Canton) province. But Pope Clement XI's bull *Ex illâ die*, confirming an earlier bull on the same subject dated the 4th November, 1704, by deciding that these observances were incompatible with Catholic belief, aroused violent anger on the part of the Emperor K'anghsi and dealt a blow to the missions from which they have never recovered. The emperor died before the legate especially sent to China to carry out the bull could perform his promise to endeavor to persuade the Pope to modify its terms; and decrees of great severity were issued against Christianity by his successors, Youngchêng and Chienlung, to which Pope Benedict XIV replied in 1742, by issuing a bull deciding this unfortunate question in its narrowest sense. The severity of the imperial decree was, however, mitigated in favor of the missionaries at court—at first Jesuits, and after the dissolution of that order Lazarists; and a European religieuse continued to be a director of the board of astronomy down to 1814.

* Jacquemart: "History of the Ceramic Art," translated by Mrs. Pallier, p. 50.

† Dr. Bushell: Letter in North China Herald, May 12, 1888.

The high position gained by the Jesuits was both won and maintained chiefly by their high attainments in astronomy, in mathematics and in geometry. It, however, enabled these able and enlightened representatives of western learning to exercise a considerable degree of influence upon other matters not directly connected with the studies for which they were chiefly famous, but in which their scientific education gave them the power and right to speak with authority. When, therefore, contemporaneously with the enjoyment by them of this position of influence, a style of decoration was adopted for porcelain and enamels for both imperial and general use purely European in its character—not only in the more intimate acquaintance, as compared with previous native drawing, of the laws of perspective displayed, but even to the reproduction of European dress and figures and eminently European scenes and pastimes—it seemed that this could scarcely be mere coincidence. It was more natural to suppose that under the direction of one of these able missionaries a school had been established in connection with the government porcelain factories for instruction in European designs, in European ideas of grouping floral ornamentation and in the European style of painting generally. Père d'Entrecolles, it is true, makes no allusion in his famous letters to such a school. But, as they were written for the purpose of enlightening the west regarding the composition of the materials and the system of manufacture employed by the Chinese, the use of European designs in the decoration of porcelain might well have been passed over in silence, and the absence of such reference would not necessarily prove that such a school had not existed.

The supposition that some of the Jesuits were at this time more or less intimately associated with the manufacture and decoration of porcelain was supported by the belief, which is still current among Chinese experts, that the secret of the composition of the *sang-de-bœuf* coloring and of its peculiar glaze marked with pittings resembling those noticeable on orange peel (specimens of which are now so highly prized by collectors) was discovered by a missionary, and that its Chinese designation (*Lang-yao* or *Lang* ware) preserves to the present day the first syllable of the inventor's surname.* Researches kindly undertaken at my request by Abbé Alphonse Favier, the vicar-general of Chihli province, into the ancient episcopal records and valuable library at Peking have, however, failed to discover any mention of the establishment under missionary direction of a school for the special purpose of porcelain decoration. Had it existed, the fact would undoubtedly have been

* How much, or if any, credence should be attached to this statement is doubtful. This is the only explanation I have heard given of the Chinese name of this porcelain. On the other hand, I can find among the list of missionaries of that time no surname commencing with any syllable at all like *Lang*. In China *omne ignotum pro magnifico* is especially true; and, as in the case of the beautiful red coloring of the Hsüanté period, so in the *sang-de-bœuf*, the brilliant tint is commonly believed to result from the use of powdered rubies.

chronicled in the records left by such careful and methodical workers as these Jesuits priests were; and the explanation which the existence of such a school would have afforded must therefore be abandoned. Abbé Favier, however, informs me that FF. Castiglione and Attirer were noted painters at Peking both of portraits and of landscapes, and that they formed a school, paintings by their pupils having come into his possession. It may then, I think, be confidently assumed that the Imperial family having in the first instance been struck with the beauty of the ornamentation on the enamel watches, snuff-boxes, etc., which came to China from France during the reign of Louis XIV, a somewhat similar style of decoration was introduced about 1728, or shortly after, for articles intended for imperial use; and that subsequently the Jesuit brothers, Castiglione and Attirer were commissioned to execute European designs, which were sent to Chingtê-chên, to be there copied on porcelain. As no article which was not perfect in every detail could be forwarded to Peking, many of the pieces ordered for the court would then (as now) be rejected by the superintendent of the manufactory, and be retained by him or his subordinates. These would gradually pass into other hands, and possessing at once the charm of novelty and the merit of being in a style appreciated at court, would serve as models in the decoration of more ordinary ware.

About the same period, that is, during the later years of Yungchêng's reign, which ended in 1735, Ku Yüeh-hsüan, a subordinate officer, I believe, in the directorate of the Chingtê-chên factories, introduced the use of an opaque-white vitreous ware for the manufacture of articles of small dimensions, such as snuff-bottles, wine-cups, vessels for washing pencils in, etc. The vitreous nature of the body imparted a tone and brilliancy to the colors used in the decoration which was greatly admired; and, under the auspices of T'angying, all the artistic and technical skill of the government factory was lavished upon these little gems, which are certainly among the masterpieces, if not *the* masterpieces, of ceramic art in China, being valued more highly than jade by Chinese connoisseurs of the present day. The decoration of the best specimens of this ware will well repay minute study. The choice of groundwork is effective, the grouping of the colors soft and harmonious, the introduction of European figures is interesting, and the arrangement of flowers evidences the highest artistic skill. Nos. 324 to 327 are admirable specimens of this very rare ware. The earliest pieces were marked, usually in red, *ta-ch'ing-nien-chih*, "Made during the great Pure (the Ch'ing or present) dynasty," as in No. 323; the later pieces, during Chienlung's reign (1736 to 1795), had the mark within a square seal-like border, *Chien-lung nien-chih* "Made during the reign of Chienlung," engraved in the foot, and filled with a thick, bright-blue enamel glaze. It is said that when specimens of this ware were submitted to the Emperor Yungchêng he expressed his high admiration of their beauty, but at the same time a regret that it should not be possible to

obtain the same brilliant transparency of color upon the ground of greater purity which was afforded by the best porcelain as compared with the vitreous composition employed. T'angying's energies were immediately devoted towards fulfilling the emperor's desire, his efforts being certainly crowned with a very large measure of success. He appears to have employed for his purpose a very pure glaze of a highly vitrifiable nature, and to have thereby obtained an enamel brilliancy that no other porcelain shows, and to have also secured to a considerable extent the same soft transparency in the decorative colors which was so much appreciated on Ku Yüeh-hsüan vitreous ware. The manufacture of this porcelain appears to have been carried on simultaneously with that of the Ku Yüeh-hsüan proper, some dating from Yung-chêng's reign and some from Chienlung's. The marks it bears correspond exactly with the later products of vitreous composition, and indeed, owing to its origin, it is known as *fang-ku-yueh-hsuan*, "modelled on the pattern of the Ku Yüeh-hsüan." Specimens of this porcelain, which is quite rare, are held in very high esteem by the Chinese, alike for the purity of the paste, the brilliance of the glaze and the beauty of the decoration, and are considered among the first productions of the period during which the manufacture attained its highest excellence. Nos. 328 to 336 are good specimens, and afford a fair criterion of the merits of this porcelain.

The three-quarters of a century above mentioned (1698 to 1773) was marked by the production of articles which are masterpieces of Chinese ingenuity and of skilful workmanship. Vases of various forms are fitted with a central ring, which, while it is separate from the vase and movable at will in a horizontal direction, still cannot be detached. Other vases there are having the body formed of two shells, the outer portion consisting in part of a geometric design or of bunches of flowers in open-work, revealing a historical representation, or a group of flowering plants beautifully painted upon the inner tube. Others again exhibit the peculiarities of both these varieties combined, it being possible to make the open-work exterior revolve, in order to bring to light the painted decoration within, but without possibility of separating it from the vase itself. There are still others of which the exterior shell is divided into two, generally unequal, parts, each having scalloped or lambrequin edges some inches in depth, which fit exactly into one another but are still movable, though neither can be detached entirely from the internal body. What process was adopted to secure this mobility and prevent the movable section from becoming attached to the other portions of the vase in the process of baking is a mystery which has never as yet, I believe, been satisfactorily explained. The beautiful hexagonal and octagonal lamp-shades of delicately thin porcelain either reticulated or ornamented with paintings and reticulated edges are productions of this period equally admired and now no less rare than the above.

During Chienlung's reign a considerable change is noticeable in the style of ornamentation—a change undoubtedly brought about by the influence of foreign designs. During the latter portion of the Ming dynasty, though arabesque decoration was known to the Chinese under the title of *huei-huei*, or Mohammedan style, and was also utilized, the ornamentation upon porcelain, when it was not floral in its character or formed of historical or mythological scenes, consisted almost entirely of reproductions of the patterns found upon the brocaded satins of that date. Under the earlier emperors of the present dynasty, though the decoration was marked by greater wealth of detail and by far greater artistic skill than at any previous time, it remained in essential character the same. On Chienlung porcelain, however, it exhibits a decided tendency towards the styles of western decoration, showing in some cases a close resemblance to the foliate ornamentation which plays so important a part in the illumination of mediæval missals, in others to designs which are usually considered Persian or arabesque in their origin. This marked modification is no doubt due in part to the influence of the designs sent from Persia to be copied in China on porcelain ordered from that country, and after their return home to that of the Chinese potters (whom Shah Abbas I, about the year 1600, had invited to Persia, with the object of improving the manufacture of porcelain at Ispahan), and in part to the influence of the Limoges enamels which had been sent by Louis XIV to the Emperor K'anghsi and which, subsequent to that date, succeeding emperors had obtained from the Jesuit missionaries. These enamels seem indeed to have served as models to be reproduced with fidelity in every detail. For M. du Sartel gives the drawing of a low, open porcelain cup with two handles in the collection of M. Marquis of Paris, which is described as being the exact counterpart of a Limoges enamel, even the signature J. L. (Jean Landrin, an enameller of that town) being reproduced upon the foot.

At about the same period it became customary for nobles and wealthy individuals in Europe to order services of porcelain from China bearing their family arms. Indeed if tradition can be trusted the practice originated two centuries earlier; for the Emperor Charles V (1519 to 1555) is said to have ordered from China a complete service ornamented with his armorial bearings and monogram. The service is supposed to have passed into the hands of the Elector of Saxony after the emperor's withdrawal to Innspruck, and some plates now in the Dresden collection, marked with a double C, enclosing the crowned double-headed imperial eagle, with coat of arms and collar of the Order of the Golden Fleece, are believed by the writers responsible for the above statement to be portions of this service. Judging, however, from the style of decoration, I am of opinion that this belief is erroneous, and that the plates in question were manufactured more than a century later than Charles V.'s abdication. The French *Compagnie d'Orient et des Indes Orientales*, whose title was shortly afterwards changed to *Com-*

pagnie de Chine, during the short period it existed, 1685 to 1719, brought from China, together with an extensive supply of other porcelains, services specially ordered, bearing the arms of France, of Penthievre, and of other distinguished families. Some of the services, *e. g.*, the plates bearing the arms of England, France and the provinces of The Netherlands, preserved in the Huis ten Bosch at the Hague, undoubtedly date from the first half of K'anghsi's reign, but the great majority are of later origin, and possess a considerable degree of excellence both as to form and decoration.

FROM 1796 TO 1820.

The truly great monarchs K'anghsi, Yungchêng and Chienlung* were succeeded by Chiach'ing (1796 to 1820), Chienlung's idle and dissolute son, whose administration was characterized by a feebleness hitherto unknown under Manchu rule, and was so detested as to occasion attempts to assassinate the vicegerent of Heaven—a stupendous crime in such a country as China. The porcelain factories, in common with all branches of the government service, languished under the effects of this want of energy, and little worthy of special mention was manufactured. As the result of the high excellence already attained, good work continued to be performed, but it fell short of what the court had grown accustomed to, and no initiative was taken to attempt originality either in design or decoration.

FROM 1821 TO 1850.

Chiach'ing was succeeded by his second son, who assumed the title of Taokuang (1821 to 1850), a ruler whose good intentions to root out the abuses which had grown up during his father's reign were largely neutralized by natural indolence. His difficulties were, besides, greatly increased by the war with France and England, and the outbreak shortly after of the great Taiping rebellion, which during his reign and that of his son (Hsienfêng, 1851 to 1861) devastated sixteen out of the eighteen provinces of the Chinese Empire, and threatened the overthrow of his dynasty. Notwithstanding these serious causes for anxiety, he found time to devote some attention to the ceramic art, and the porcelain manufactured for his own use, and marked with the designation he gave to his own palace, *Shen-tê-t'ang*, compares not unfavorably with similar productions under Yungchêng and Chienlung, and is at the present day much sought after by Chinese connoisseurs.

FROM 1850 TO 1888.

The productions of his successor are marked by rapid decadence, and the rebels, when they overran Kiangsi province, having entirely

* Chienlung abdicated in order to escape disrespect to his grandfather by occupying the throne for so long a period as he had reigned.

destroyed Chingtê-chên and its factories, the manufacture of porcelain ceased entirely.

During the reigns of his son T'ungchih (1862 to 1874) and nephew Kuanghsii (1875 to date) the manufacture has been renewed and great attention paid to its improvement, but it still falls far short of the classic periods of Yungchêng and of Chienlung. Some of the decorations in *sepiâ* exhibit considerable artistic merit, and a style of decoration consisting of flowers and butterflies in black and white upon a pale turquoise ground was highly appreciated some fifteen years ago among foreigners. The greatest measure of success has, however, of late years been gained in the reproduction of the *famille verte* decoration of the first half of K'anghsi's reign, and of this ornamentation or of plum-blossom on black grounds. So good are these imitations that a practised eye can alone detect the false from the real, and I have known a pair of black-ground vases, only two or three years old, purchased by a foreign dealer for over \$1,000, under the belief, no doubt, that they dated from the time of K'anghsi or of Chienlung.

INTRODUCTION OF CHINESE PORCELAIN INTO EUROPE.

M. Brongniart stated that porcelain was first introduced into Europe by the Portuguese in 1518. Researches made since the publication of this work in 1844 prove, however, that oriental porcelain was known in Europe many years prior to that date. In New College, Oxford, is still preserved a *céladon* bowl mounted in silver richly worked, known as "Archbishop Warham's cup" and bequeathed by that prelate (1504 to 1532) to the college, which was imported into England before the reign of Henry VIII. Marryat, in his history of Porcelain, also mentions some bowls which were given to Sir Thomas Trenchard by Philip of Austria when, after leaving England to assume the throne of Castile in 1505, he was driven back by a storm to Weymouth and entertained there by Sir Thomas. These bowls are said to have been preserved by the Trenchards, and to be of white porcelain decorated with blue under glaze. From M. du sartel's work we learn that amongst presents sent by the Sultan to Lorenzo de Medici in 1487 were porcelain vases; and that this ware is mentioned about the same time in the maritime laws of Barcelona as one of the articles imported from Egypt. In letters, too, addressed by the Venetian ambassador at the court of Teheran in 1471 to his government frequent mention is made of porcelain; and some decades earlier, in 1440, the Sultan of Babylonia sent three bowls and a dish of Chinese porcelain (*de porcelaine de Sinant*),* to Charles VII, King of France, by the hands of a certain Jean de Village, the agent in that country of a French merchant named Jacques Cœur.

Nearly three centuries earlier still, mention is made in an Arabian MS., known as the Makrizi MS., in the National Library, Paris, and

* Du Sartel: "Histoire de la Porcelaine Chinoise," p. 28.

translated by the Abbé Renaudot, of a service of china-ware, consisting of forty pieces of different kinds, sent with other presents to Nur-ed-dîn, the Kaliph of Syria, by his lieutenant, Saladin (afterwards the hero of the Crusades), soon after his conquest of Syria, in the year of the Hegira 567 (A. D. 1188). "This," says Mr. A. W. Franks in the catalogue of his own collection, now in the British Museum, "is the first distinct mention of porcelain out of China"; but, in common with other writers on the subject, he refers the date of the present to 1171, though that year appears not to correspond with the Mohammedan date mentioned in the original text.

From Chinese sources (the *Ming-shih*, or History of the Ming Dynasty, and the Hsi-yang-ch'ao-kung-tien-lu, or Records of Tribute Missions from the West), we learn that the famous eunuch Chênggho carried Chinese arms as far as Ceylon during the reign of Yunglo (1403 to 1425); that under his successor in 1430 the same eunuch and an associate envoy, Wang Ching-hung, were sent on a mission to Hormuz and sixteen other countries, and that Chênggho dispatched some of his subordinates on commercial ventures to Calicut, on the coast of Malabar, and even as far west as Djiddah, the port of Mecca. "En 1431 ou 1432," says Heyd,* "on y vit même arriver plusieurs jonques chinoises qui n'avaient pas trouvé à écouler leurs marchandises à Aden dans de bonnes conditions. On les y reçut avec empressement dans l'espoir que leur visite serait le début d'un trafic avec la Chine." The expedition was evidently a large one, and one of its objects was commercial intercourse, porcelain being specially mentioned among the articles with which the vessels were freighted. Porcelain had, however, reached these countries at a far earlier date. Marco Polo, traveling in 1280, mentions the trade in this ware from Quinsai, the present Hangchow, and from Zaitun, a port on the Fukien coast, which has been identified with Ch'üanchou (better known as Chinchew) by Klapproth and other writers, whose view has been adopted by Colonel Yule in his magnificent edition of that famous traveler's voyages, and with Changchow and its port, Geh-Kong (a short distance south from Chinchew, and inland), by Mr. George Philips, of Her British Majesty's consular service in China. And Ibn Batuta, an Arabian traveler, who wrote in 1310, states distinctly that "Porcelain in China is worth no more than pottery is with us; it is exported to India and other countries, from which it is carried even to our own land *Maghreb*," i. e., the sunset, the name given by the Arabs to all that part of Africa which lies to the west of Egypt.

ROUTE FOLLOWED.

Chinese history fully confirms the above statement, and, indeed, shows that this commerce had already long existed at the time Ibn Batuta

* "Historie du commerce du Levant" (Vol. II, p. 445), quoting Quatremère's "Mémoire sur l'Égypte" (Vol. II, p. 291).

wrote. In a gigantic compilation of the works of earlier authors undertaken during the reign of Yunglo (hence termed the *Yung-lo-ta-tien*), the MS. of which was presented to the throne in 1407, is preserved "an account of the countries fringing the Chinese border" (*Chu-fan-chih*), written by Chao Ju-kua, who was inspector of foreign trade in Fokien during the Sung dynasty. As the author speaks of the time of Mohammed "as twenty-nine generations, or six or seven hundred years ago," his work would seem to have been written during the first half of the thirteenth century; but as he mentions a tribute mission sent by the Arabs to China in the K'aihsi period (1205 to 1208), probably later than the latter date. The compilation was, however, considered too extensive and the printing was never completed, though the more important works relating to periods preceding the Yüan dynasty were re-edited and published by the Emperor Chienlung. One of these was Chao Ju-kua's work. It contains much valuable information regarding the Arab trade of the twelfth century, and, as it takes Chi'anchou (Chinchew) as the starting-point from which all voyages start and distances are computed, it appears to support Klaproth's identification of Marco Polo's Zaitun with that town. From this work it is evident that a large and valuable trade was carried on between China and Brni in Borneo, with *Chan'chéng*, comprising a portion of Cochin China, with Cambodja (*Chénla*), with Java (*Shè-po*), with *San-po-ch'i*, which another Chinese work, the *Ying-hai-shéng-lan*, states to be another name of Palembang (*Po-lin-pang*) in Sumatra—at which latter place the products of China and countries south of it were stored up for barter with Arab traders for the goods of Europe, India, West Asia, and Africa—and with Lambri, on the northwest coast of the same island. Occasionally Chinchew junks proceeded onward to Coilom, a well-known sea-port (the present Quilon) on the coast of Malabar, which is described under the name of Lampi; but as a rule it would seem that the trade westward was in the hands of the Arabs, and Chao Ju-kua mentions, indeed, incidentally that a family from Malabar was established in the southern suburb of Chinchew itself. From this point the goods were carried to Guzerat (*Hu-ch'a-la*), as part of the country of Lampi, and thence to the Arab colony in Zanzibar (*ts'éngpa*, Cantonese *ts'ang pat-ts'ang par*). Porcelain is distinctly mentioned among the principal articles carried away from China by the vessels to each of these ports and to Ceylon.* The correctness of this author's statements has lately been confirmed in a striking manner. Sir John Kirk, during his residence in Zanzibar as consul-general, formed a collection of ancient Chinese céladon porcelain, some of the specimens having been dug up from ruins, mixed with Chinese coins of the Sung dynasty.

Indeed it seems very probable that porcelain was sent at least as far west as India in the tenth century, or even earlier; for commercial rela-

* Hirth: *op.*, *cit.*, pp. 45 *et seq.*

tions between China and Sumatra are stated to have existed from the T'ienyu period (904 to 909) of the T'ang dynasty, and the name Sarbaza, which has been identified with *San-fo ch'i* (above mentioned) or Palembang, was known to Arab traders of that time, as we learn from translations of their travels by Renaudot and Reinaud. They were also acquainted with Chinese porcelain, for mention is made by one of them, Soleyman by name, who visited China towards the middle of the ninth century, "of a very fine clay in that country, of which vases are made having the transparence of glass; water can be seen through them."* Indeed earlier, during the eighth century, Arab writers mention the presence in the Persian Gulf of fleets of large Chinese junks.

At this date the Arab trade with China was evidently very extensive, and the colonies of Arabs at Canton and at Canfu, the port of Quinsai (the present Hangchow), very large. They are said to have been so numerous at the former place in the eighth century as to have been able to attack and pillage the city. While at Canfu the Soliman above referred to (the manuscript account of whose travels was written, says his commentator, Abu Zaid Al Hasan, in A. D. 851) mentions the fact that "a Mohammedan held the position of judge over those of his religion, by the authority of the Emperor of China, who is judge of all the Mohammedans who resort to those parts. Upon festival days he performs the public service with the Mohammedans, and pronounces the sermon or kotbat, which he concludes in the usual form, with prayers for the Sultan of Moslems. The merchants of Irak—*i. e.*, Persia—who trade thither are no way dissatisfied with his conduct or administration in this port, because his decisions are just and equitable and conformable to the Koran." And the commentator on these travels, Abu Zaid Al Hasan, who probably wrote early in the tenth century, when speaking of the interruption then recently caused in "the ordinary navigation from Siraf to China," states this to have been occasioned by the revolt of "an officer who was considerable for his employment, though not of royal family," named Baichu. He laid siege to Canfu in the year of the Hegira 264 (A. D. 885). "At last he became master of the city, and put all the inhabitants to the sword. There are persons fully acquainted with the affairs of China, who assure us that, besides the Chinese who were massacred on this occasion, there perished 120,000 Mohammedans, Jews, Christians, and Parsees, who were there on account of traffic. The number of the professors of these four religions who thus perished is exactly known, because the Chinese are exceeding nice in the accounts they keep of them."†

Apart, however, from this sea route, porcelain might possibly have followed the course of the overland traffic through Central Asia, the use of which can be traced back to a very remote antiquity, some au-

* Reinaud's translation, p. 34, quoted by M. du Sartel.

† Harris's "Collection of Voyages" (764), Vol. I, pp. 523 and 530.

thorities claiming that there are indications of communication by this route between China and the West so early as 2698 B. C., and that in 2353 B. C. an embassy arrived in China from a country which is supposed to have been Chaldea.* There is, therefore, nothing impossible in the claim put forward that a small ivory-white plate having uncut emeralds and rubies, set in gold filigree, let into paste, and the Chinese word *fu* (happiness) marked on the foot in the seal character under the glaze, now in the royal collection at Dresden, was brought into Europe by a crusader in the twelfth century; provided, of course, the paste, glaze, etc., correspond with those which characterize the porcelain manufactured in China about that date or prior to it.

KIND OF PORCELAIN CARRIED WESTWARD.

What then was the porcelain that participated in this early trade? Chao Ju-kua, in the single instance in which he alludes to its color, states it to have been "white and *ch'ing*, or *céladon*." It would almost necessarily have consisted of strong, coarse ware, in order to resist the chances of breakage consequent upon the many transshipments incidental to these long voyages in the rude craft of those early ages, and to allow its sale at the comparatively cheap rates at which it was disposed of in Ibn Batuta's day. Colonel Yule has thought that during the Yüan dynasty it probably came from the Ching-tê-chên manufactories, but this scarcely seems probable, for the *T'ao-shuo*, or "Treatise on Pottery," states that no porcelain was then made there, except by imperial order and for the court. Zaitun—whether Chinchew. Chang-chou, or "the Amoy waters" (Dr. Douglas' compromise between the two—as the headquarters of the western trade, would naturally receive supplies for export of *Kuan-yao* and of *Ko-yao* (both *céladon* in color) from the not far distant factories at Hangchow and Lungch'üan respectively, as well as from the more distant factories, most of the productions of which were at this time also *céladons*. And *céladon* porcelains bearing all the distinctive characteristics of the Chinese manufactures of that nature have been discovered in almost all parts of the then Mohammedan world and in the countries visited by the early Arab traders.

Mr. Carl Bock, speaking in his "Head Hunters of Borneo" of the Dyak, says:

Among his greatest treasures are a series of *gudji blanga*, a sort of glazed jar imported from China, in green, blue, or brown, ornamented with figures of lizards and serpents in relief. These pots are valued at from 100 florins to as much as 3,000 florins (£8 to £240) each, according to size, pattern, and, above all, old age, combined with good condition. According to the native legend, these precious vases are made of the remnants of the same clay from which *Mahatara* (the Almighty) made first the sun and then the moon. Medicinal virtues are attributed to these urns, and they are

* Sir Charles Wilson's "Address to Geographical Section of the British Association," Bath, 1888.

regarded as affording complete protection from evil spirits to the house in which they are stored. A very full account of the various legends connected with these *gudji blanga* is given in Mr. W. T. H. Perelace's most interesting work *Ethnographische Beschreibung der Dyaks*, pp. 112-120.*

Mr. Bock saw Dr. Hirth's collection of Lungeh'ian céladons, and found in it pieces resembling the ware preserved by the Dyaks, but specimens are, it appears, common among them which bear no resemblance to any of the celebrated monochrome wares of the Sung and Yüan dynasties, a fact Dr. Hirth would explain by supposing that "they came from factories equally old, but less renowned, such as the place where the *Chien-yao* of the Sung dynasty was made, the city of Chien-yang in the north of Fukien, which is all the more likely since Chao Ju-kua, in his description of the trade with Borneo, specially mentions 'brocades of Chien-yang' among the articles of import there."†

A controversy has, however, recently arisen as to whether the céladon vases found throughout the Mohammedan world are really of Chinese origin at all. Professor Karabacek, an Arabic scholar of Vienna, maintains that the "large, heavy, thick, green céladon dishes with the well-known ferruginous ring on the bottom, which have been found spread over all the countries of Arab civilization," are not of Chinese origin, basing his theory mainly on the statement made by Hâdschi Chalfa, an encyclopedist who died in 1658, that "the precious, magnificent céladon dishes and other vessels seen in his time were manufactured and exported at Martaban, in Pegu." The Arab designation Martabani is applied by Professor Karabacek to the thick, heavy céladons. It would, however, appear to have been also applied to a variety of entirely different character.

Jacquemart, in his "History of the Ceramic Art," quotes Chardin's "Voyages en Perse" as follows: "Everything at the King's table is of massive gold or porcelain. There is a kind of green porcelain so precious that one dish alone is worth 400 crowns. They say this porcelain detects poison by changing color, but that is a fable; its price arises from its beauty and the delicacy of the material, which renders it trans-

* The possession of these vessels by the Dyaks, their use and value, are also chronicled by earlier travelers. The belief in the efficacy of porcelain vessels to detect poison in liquids contained in them is of ancient date and not confined to Asia alone, though the manner in which the porcelain was affected by the presence of poison appears to have varied in different cases. Thus, Guido Pancirolli, the learned jurisconsult and antiquary of Padua (d. 1599), and his editor, Salmutti ("Guidonis Pancirolli, J. C., claris. rerum memorabilium libri duo; ex Italies Latine redditus et eotis illustrati ab Henrico Salmutti," Antwerp, 1612) state that the presence of poison caused the porcelain either to break or to change color; while Dumont, in his "Travels in Turkey," 1699, states that it caused the liquid to effervesce in the center while it remained cool near the vessel itself, the Turks, owing to this property, preferring porcelain to silver as the material of dinner services. Salmutti mentions the presentation to himself of one of these vessels by an Austrian prince, and Paul Hentzner ("Itinerarium Gallie, Anglie, Italie," 1616) says he saw some of them in the Farnese Palace at Rome.

† Hirth, *Op. cit.*, p. 50.

parent although above two crowns in thickness," and then adds: "This last peculiarity has a great importance. It is impossible to suppose travelers would here allude to the sea-green *céladon*—this, laid upon a brown, close paste approaching stoneware, is never translucent. In the *martabani*, on the contrary, a thin, bright, green glaze is applied upon a very white biscuit, which allows the light to appear through. * * * Its name leaves no doubt of its Persian nationality. Martaban (*Mo-ta-ma*) is one of the sixteen states which composed the ancient kingdom of Siam; it would not be impossible, then, that we must restore to this kingdom the porcelain mentioned in the Arabian story."

No porcelain, however, is known to have been made at Moulmien (Martaban), Bangkok, or Burma, and the burden of evidence is strongly against Professor Karabacek's contention of a non-Chinese origin for the *martabani* or *céladon* porcelain. Probably the designation *martabani* was applied to this ware in much the same manner as "Combronware" was applied in England after 1623 to porcelains brought from China to that port on the Persian Gulf, and purchased there for shipment home by the factory of the India Company before it extended its operations to China (when these products came to be termed "China-ware"), or in the same manner that "Indian China" is applied in America to porcelain shipped from Canton, and with as much reason.

Indeed, M. du Sartel, in accord with most other writers on the subject, maintains that no true porcelain was produced in Persia at all, and that the designation of such ware *Tchini* not only means that the earliest specimens and mode of manufacture were of Chinese origin, but that they one and all actually came from China. The Persians, it is true, manufactured a kind of ware which has been designated "Persian porcelain," but it was of so soft a nature that it could be not only scratched, but actually cut, with a knife, and was entirely distinct from hard, kaolinic porcelain. The supplies of the latter were, M. du Sartel maintains, derived entirely from China, to which country models, shapes, and special kinds of ornamentation were sent for reproduction, a custom which sufficiently explains the presence of a Persian name, or the word *fermaïche* ("by order"), written in Arabic characters, upon porcelain of undoubtedly Chinese origin.

This opinion requires, I apprehend, further investigation prior to its acceptance as fact. It is, however, recorded that Shah Abbas I, a great patron of all the arts, about the year 1600 invited a number of Chinese potters to establish themselves at Ispahan for the sake of introducing improvements in the manufacture of porcelain. Though several new methods were adopted, and though a new style of decoration, half Chinese, half Persian, was largely used for a long period after the arrival of these potters, it is generally admitted that no hard porcelain resembling that of China was even then produced in Persia. And one can not help being struck by the strong similarity, amounting practi-

cally to identity, between the vases contained in the cases devoted to so-called Persian porcelain in the Dresden collection and certain other vases in the same collection which are classed as Chinese.

CHINESE AND EUROPEAN SYSTEMS OF MANUFACTURE COMPARED.

Whatever the variety of the Chinese porcelain was which constituted so important a factor in this early Arab trade, and whatever the date at which it made its first appearance in Europe, specimens of it had, prior to the commencement of the second half of the seventeenth century, found a place in the collections of princes alone. About that time, however, Chinese porcelain became more generally known, and the fine quality of the glaze, its transparency, and the brilliant style of its decoration excited universal admiration. Strenuous efforts were at once made on all sides to discover the secret of its manufacture, but these researches, though resulting indirectly in other discoveries and in great progress in the European manufacture, were not crowned with success. They had, in fact, led to the creation, in France and England, of soft porcelain, which, if in some respects superior to the Chinese porcelain from a decorative point of view, was also more fragile and more easily scratched than the latter. This soft porcelain was made in France, at St. Cloud perhaps about 1695, at Chantilly in 1735, at Vincennes in 1740, and at Sèvres in 1756; and in England, at Chelsea in 1745, at Derby in 1748, and at Worcester in 1751. Recourse was then had to the Jesuit missionaries in China, with the result of obtaining the valuable letter from P. d'Entrecolles, dated 1712, supplemented ten years later by further details. The difficulty incident to translating technical Chinese expressions, combined with want of acquaintance with chemistry on the part of the author, as well as the primitive condition of that science more than one hundred and fifty years ago, prevented the practical use of the information supplied by P. d'Entrecolles. An attempt was made to secure the knowledge desired by obtaining specimens of the materials employed. The fact, however, that these were sent either in a partially fused state or in the forms of several almost impalpable powders mixed together prevented a recognition of their real nature.

What it had been impossible to learn by direct inquiry was, however, discovered by chance. In 1718 Bottger found an important bed of white and plastic clay in Saxony, and with it made the first "hard" porcelain manufactured in Europe. The Government had this bed carefully guarded, imposed oaths of secrecy upon the staff employed, had a strict account kept of all the clay taken out, and transported it under armed convoy to Albrechtsburg, the place of manufacture, which was converted into a veritable fortress. In spite, however, of these precautions the secret leaked out in course of time, and with it the clay also, to Vienna and St. Petersburg. Later, in 1765, Guettard discovered in France the kaolin of Alençon, and Macquer, three years later, found the remarkable beds of Saint-Yrieix.

The History of the Porcelain manufactories at Chingtê-chên, translated by M. Julien, containing as it does a detailed account of the procedure followed there, permits a comparison between the systems employed in China and in Europe. In view of the interest attaching to such a comparison no apology is needed for the following brief notes on that subject, based chiefly upon the preface to M. Julien's work from the pen of M. Salvétat, a member of the directory of the Government manufactory at Sèvres.

COMPOSITION OF PORCELAIN.

Porcelain is composed of two parts—the one, infusible, the paste (*pâte*), which is required to supply the body of the vessel, or, as the Chinese term it, to give it “bone;” the other, fusible, the glaze (*glacure, couverte*), which imparts its characteristic transparency to porcelain and at the same time prevents the vessel retaining its porousness or contracting under the influence of heat.

The principal ingredients of the paste are clays, which are classed according to their greater or less degree at the same time of plasticity and fusibility. The porcelain clay *par excellence* is kaolin, a white silicate of alumina produced by the decomposition of granitic or feldspathic rocks, almost infusible, and if not always perfectly white by nature, losing its tint in the kiln. It derives its name originally from that of the hill whence the manufactories at Chingtê-chên procured their supply of this clay. The main object of the glaze is, as has been stated, while securing transparency, to prevent the paste remaining porous. Now, the substances unaffected by water but fusible by fire are quartz, silica, certain limestones, pegmatite, feldspar, silix, and the compounds resulting from a superficial fusion of these substances, which are then reduced to a fine powder. The relative proportion of these substances in the composition of the glaze may be raised at will with a corresponding diversity of result—M. Brongniart dividing the compound into three classes, each subdivided into three groups.

In ordinary language porcelain is classified under two grand divisions, hard paste and soft paste—*la pâte dure* and *la pâte tendre*. The latter is characterized by the presence, either naturally or artificially, of limestone products or alkalis, either in the condition of phosphates or in that of marl or chalk, which lower its degree of fusibility, so that it becomes fusible or at least soft at a temperature of 800° C. The absence of these matters in the hard paste causes it to retain its original consistency in far greater heat, and it can resist a temperature of 1,500° C., or above. Upon these two divisions are grafted several minor ones determined by the kind of glaze, which, according to its composition and mode of application, is termed *verniss, émail, or couverte*. After unglazed tiles and bricks, the primitive thin glaze, *verniss*, is found on the pottery of the Etruscans, ancient Arabs, Persians, and the early inhabitants of America; then, on that manufactured in Germany and Italy in the

fourteenth century, a sort of transparent glass with a foundation of lead—a glaze still common in country productions. Later, in the fifteenth century the true white enamel, *émail*, a mixture of salt, of lead and tin, the thickness of which concealed the color of the paste, was discovered in Italy and gained immortality for Luca della Robbia of Florence, and Oragio Fontana of Pesaro. In this category also belong the majolicas, faenza, the faiences of Nürnberg, Bernard Palisy's pottery, the faiences of Nevers, Rouen, and other places, ancient and modern. The *couverte* is confined to porcelain proper.

Crude Chinese kaolin, when cleansed by washing out its impurities, and ready for use in making the paste, gives a very white clay, soft to the touch, possessing a plasticity very similar to that of Saint Yrieix, which is derived from decomposed pegmatite. The residue left by the washing contains a good deal of quartz, crystals of feldspar partially decomposed, and flakes of mica, as would be found in graphic granite. Analysis shows that the fusible portion consists chiefly of petrosilex and, by its composition and density, closely resembles the rock found in abundance at Saint Yrieix, which, without addition, furnishes the glaze for hard porcelain at Sèvres.

The composition of Chinese and of the most celebrated of European porcelains may be compared in the following table:

[Average of six analyses.]

	Chinese.	Sèvres.	Foëcy.	Paris.	Limoges.	Vienna.	Saxony.
Silica	69.20	58.00	66.20	71.90	70.20	57.70	58.10
Alumina	22.60	34.50	28.00	22.00	24.00	36.80	36.70
Oxide of Iron	1.60	.....	0.70	0.80	0.70	0.70	0.70
Lime	0.65	4.50	Trace.	0.80	0.70	1.60	0.70
Magnesia	Trace.	.....	Trace.	.....	0.10	1.40	0.40
Alkalies	5.00	3.00	5.10	4.50	4.30	1.80	3.40
.....	.....	100.00	100.00	100.00	100.00	100.00	100.00

Thus, generally speaking, Chinese porcelain contains more silica and less alumina than do the products of the manufactories of Sèvres, Vienna, and Saxony, respectively. The effect of the presence in greater or less degree of these components is well known by the Chinese, who say that to produce fine porcelain the ratio of alumina must be increased; to produce the commoner kinds that of silica must be increased. In Europe experience has taught the same results. The porcelain of commerce shows much the same composition as do the specimens of Chinese analyzed by M. Salvétat, also presumably ordinary ware and not the finest grades intended for Imperial use, while in the three Government establishments mentioned a larger ratio of alumina is introduced, because it resists high temperatures and is therefore necessary to enable the designs painted to maintain their sharpness of outline. In some cases the Chinese also employ ferruginous kaolins, which sensibly diminish the value of the manufactured article.

SHAPING THE PASTE.

In China the paste is roughly shaped, is turned, and is molded when in a malleable state, in much the same manner as in Europe. Casting or *moulage en barbotine* appears to be unknown in China. The absence of this process, which has enabled European artists to produce such grand results, only increases our admiration of the manual dexterity which has enabled the Chinese to manufacture such numbers of jars of large dimension and cups so thin, as egg-shell porcelain, which can now, or could at least when M. Salvétat wrote, only be produced at Sèvres by casting. The sculpture, the hollowing out, the shaping, etc., are practised also in China in much the same manner as in Europe. Among the happiest effects produced in this line are engraving in the paste, sculpture in relief on the paste, and the open work which the French term *pièces réticulées*.

One peculiarity of the Chinese system is the method of completing the foot in the unbaked state and after being covered with glaze. This custom of laying on the glaze before the article has been completed, the method in which the glaze is applied, and the composition of the glaze present, perhaps, the greatest contrasts with the corresponding manipulations employed in Europe. It is certainly curious that the Chinese after a practical experience extending through so many centuries, should be ignorant of the advantages to be derived from submitting the article to a slight baking before applying the glaze, which is then in a condition termed by the French *l'état dégourdi*. Porcelain earth, like other clays, is dilutable by water, but it ceases to be so after exposure to a temperature which makes it red. On this property is based in Europe an expeditious and easy method of covering porcelain with glaze. The porcelain having been rendered indissoluble and absorbent by a preliminary slight baking, it may be covered with a uniform layer of suitable thickness by a simple immersion in water holding the finely crushed material in suspension, provided that the proportions of water and glaze (relatively to the thickness of the vessel to be covered) have been duly determined. The failure to employ this process is the more curious since, from Mr. Hoffman's sketch of the Japanese system of manufacture appended to M. Julien's work, it appears that in that country the glaze is applied to porcelain after preliminary baking.

GLAZE.

In Europe porcelain glaze is generally composed of pure pegmatite, finely crushed and applied by immersion after a preliminary baking. In Germany other substances, such as kaolin or paste, have been added to diminish its fusibility; but at Sèvres pegmatite from Saint Yrieix is alone used. The addition of lime in forming the glaze is a rare exception in Europe. In China, on the contrary, pure petrosilix is but very

seldom used for this purpose. The greater part of Chinese and Japanese porcelains is covered with compound glazes, obtained by a mixture of substances of which the proportions vary according to the nature of the article, lime being the material added to the petrosilix to render it more easily fusible; and, in some cases, the ratio added is so large that it represents a fourth of the total weight. In the preparation of the glaze the use of fern leaves is sometimes mentioned. The residue of the leaves after burning appears, however, to be cast aside, and what purpose these leaves exactly served has never been determined.

As regards the manner of applying the glaze the Chinese, as has been shown, are ignorant of the method of subjecting the porcelain to a preliminary baking and then utilizing the want of porousness thus gained to immerse the vessel in the liquid glaze. Instead, they apply it by aspersion and immersion or by insufflation. For example, take a cup. It is held by the outside slanting over a basin containing the liquid glaze. Sufficient of the glaze is then thrown on the inside to cover the surface. This is aspersion. The outside is then immersed in the liquid, the workman dexterously keeping the vessel in equilibrium with the hand and a small stick. The foot having remained in its original state, the cup is then carried, covered as it is with glaze, to the wheel that the foot may be hollowed and finished; a mark in color is added on the hollowed portion, which is then covered with glaze. When the ware is too delicate to be treated in this manner, the glaze is applied by insufflation. A piece of gauze attached to a hollow tube having been plunged in the colored glaze (red or blue) or uncolored glaze, the workman scatters the liquid from the gauze onto the vessel by blowing through the opposite end of the tube three, four or even as many as eighteen times.

BAKING.

The porcelain being then ready for baking, it is taken to the kilns, which are usually situated at some distance from the workshops and belong to persons whose sole occupation is to superintend the baking. The large pieces are placed one by one in a separate seggar made by hand, covers being dispensed with by piling the seggars one on another. Several of the smaller pieces are placed in the same seggar, the floor under each being covered with a layer of sand and kaolin refuse to prevent adhesion. The porcelain being still in a soft state, great care must be exercised in placing it in its seggar. It is not touched, therefore, with the hand, but transferred into the seggar by an ingenious contrivance of cords and sticks. The bottom of the kiln is filled with a thick layer of gravel on which the seggars are piled, those under the chimney, the two seggars at the bottom of each pile, and that at the top being left empty, as their contents would not be thoroughly baked. The finest pieces are placed in the center, those with harder glaze at the entry near the hearth, and the coarsest farthest in. The piles are

strongly bound together, and the stacking of the oven being completed, the door is bricked up. From the description given of the kilns by P. d'Entrecolles it appears that they are much the same as those used in early times at Vienna and Berlin.

After the baking commences a low fire is kept up for twenty-four hours, which is then followed by one more powerful. At the top of the kiln are four or five small holes covered with broken pots, one of which is opened when it is thought the baking is completed, and by means of pincers a cage is opened to test the condition of the porcelain. The baking ended, firing is stopped, and all openings closed during a period of three or five days, according to the size of the pieces, when the door is opened and the articles removed.

To bake porcelain decorated with soft colors or *du demi-grand feu*, two kinds of kilns are used—one open, the other closed—the former of which bears a close resemblance to the enameleer's kiln (*moufle*). This kind of furnace has been used in Germany to bake painted porcelain; but even in China the liability to breakage confines their use to articles of small size. The large pieces are baked in closed kilns, the general arrangement of which resembles that of the kilns known as *moufles*, but being circular in form, they are really porcelain kilns of small size.

DECORATIONS.

In the decoration of European porcelain one of three methods is followed: (*a*) The use of paste of different colors; (*b*) the introduction of the coloring matter in the glaze; (*c*) the application of the colors upon the white surface of the porcelain. The two former methods require the application of a temperature as high as that necessary to bake the porcelain; they are, therefore, termed colors *du grand feu*. The third method requires for the vitrification of the colors a much lower temperature; the colors used are therefore termed *de moufle* or of the enameleer's furnace. It is the use of this latter system which permits the reproduction with exactness of the works of celebrated oil painters.

The substances employed in the decoration of porcelain in China may be divided into two similar categories, colors *du grand feu* and *de moufle*.

Colors du grand feu.—The varieties of the grounds in these colors have played probably as important a part in the high reputation gained by Chinese porcelain as have the originality and rich harmony of the designs. The *blue* decoration under the glaze is made with the brush on the unbaked porcelain; the coloring matter being peroxide of cobaltiferous manganese, the shade, dark or light, depending on the quantity used, and the greater or less trending towards violet on the richness of the ore in cobalt. It resists the fire well, retaining great distinctness and at lower temperatures than are necessary at Sèvres. *Céladon* and the *red* grounds, at times showing an orange, at others a violet shade, had not been successfully reproduced in Europe when

M. Salvetat wrote in 1855, and he considered their production in China as due rather to accident than design. The justice of this view is, however, perhaps open to question, for the Chinese appear to have at least an empirical knowledge of the conditions necessary to produce these colors, though they are unable in all cases to insure those conditions. The *fond laque* or *feuille morte* is obtained by the use of oxide of iron, the amount of that metal and the nature of the gas surrounding the vessel in the kiln determining the tone of the color from a light shade to one resembling bronze, and warmth of color being obtained by an oxidizing atmosphere. Black grounds are produced in a variety of ways, either by the thickness of the colored glaze, or by laying several shades of different colors one on the other, or, again, by laying a blue glaze on a brown *laque*, or *vice versa*.

M. Salvetat states that among the colors for the ground employed in China some are evidently applied upon the biscuit, *i. e.*, porcelain already fired at a high temperature. These are *violet*, *turquoise blue*, *yellow*, and *green*, all containing a pretty large proportion of oxide of lead; and, vitrifying as they do at a medium temperature, hold a position half way between the two main categories and may be therefore termed colors *du demi-grand feu*. Nothing approaching these colors, he says, is produced in Europe. To do so, however, would not be difficult, the green and turquoise blue owing their colors to copper, the yellow to lead and antimony, and the violet to an oxide of manganese containing but little cobalt.

Colors de moufle.—In Europe these colors are obtained by mixing one oxide or several metallic oxides together with a vitreous flux, the composition of which varies with the nature of the color to be developed. That most generally used is termed “the flux for grays.” It serves not only for grays, however, but also for blacks, reds, blues, and yellows, and is composed of six parts of minium, two parts of silicious sand, and one part of melted borax. The colors are obtained by mixing by weight one part of metallic oxide with three parts of the flux, so that the composition may be expressed thus:

Silica.....	16.7
Oxide of lead.....	50.0
Borax	8.3
Coloring oxides.....	25.0
	<hr/>
	100.0

In cases where, as with oxide of cobalt, the colors are produced by mixture with the flux and ought to have the required shade when applied, the metallic oxides are melted with the flux prior to use; in those, however, where the desired color is that inherent in the oxide, the tone of which would be changed by a double exposure to fire, as is the case with reds derived from peroxide of iron, the union with the flux by melting is dispensed with. The colors so made suffice to permit the reproduction on porcelain of oil paintings; but it is essential that

they all melt at the same temperature and after baking present a sufficient and thoroughly uniform glaze.

In Chinese decorations these conditions, insisted upon in Europe, are both absent. Some colors, such as the rose tints derived from gold, the blues, greens, and yellows, are brilliant, thoroughly melted, and so thick as to stand out above the general level of the surface; others, such as the reds derived from iron and the blacks, are much thinner, and are almost always quite dull or only slightly glazed when thin. The style of painting in Chinese differs entirely from the European. In the majority of the specimens the forms and flesh are not modeled; strokes of black or red define the outlines; the tones do not shade; the colors are laid in flat tints on which a damask is sometimes drawn afterwards, either in the same or in different colors, but the mixture on the palette of different crushed colors, which permits of so much variety in European painting, appears not to be practiced by them. Their colors (as indeed seemed probable from the lightness of the shades obtained in spite of their thickness before analysis had confirmed the presumption) contained far less coloring-matter than do the European, a peculiarity which makes them approach nearer to the vitrified substances known as enamel than to any other. They are characterized by great simplicity and a considerable degree of uniformity.

The flux, which is not distinct in color, is always composed of silica, of oxide of lead in but slightly varying proportions, and of a larger or smaller quantity of alkalies (soda and potash). This flux contains in dissolution, in the conditions of silicates, some hundredth parts only of coloring oxides. The number of these is very small, being oxide of copper for greens and bluish-greens, gold for the reds, oxide of cobalt for the blues, oxide of antimony for the yellows, and arsenical acid and stannic acid for whites. Oxides of iron to produce red and oxides of impure manganese to produce black are not used, because no doubt these colors can not be obtained from the oxides named by means of dissolution.

In Europe, in addition to the oxides already mentioned, important results are obtained from substances unknown in China. The shade derived from pure oxide of cobalt is modified by mixing with it oxide of zinc or alumina, and sometimes alumina and oxide of chrome; pure oxide of iron gives a dozen reds, shading from orange-red to very dark violet; ochres, pale or dark, yellow or brown, are obtained by the combination in different proportions of oxide of iron, of oxide of zinc, and of oxide of cobalt or of nickel; browns are produced by increasing the amount of oxide of cobalt contained in, and blacks by omitting the oxide of zinc from, the composition which gives the ochers. The shades of yellow are varied by the addition of oxide of zinc or of tin to render them lighter, and of oxide of iron to render them darker. Oxide of chrome, pure or mixed with oxide of cobalt or with oxides of cobalt and of zinc, gives yellow-greens and bluish-greens, which may be made to vary from pure green to almost pure blue. Metallic gold supplies

the purple of Cassius, which may be changed at will into violet, purple, or carmine. Other useful colors are obtained from oxide of uranium and from chromate of iron, of baryta, and of cadmium.

In European colors all these coloring matters are merely mixed. In the Chinese the oxides are on the contrary dissolved. This peculiarity, no less than their appearance, closely connects the Chinese colors with "enamels." Both present the same coloring, obtained from the same oxides and a composition of flux very similar, sometimes identical. Transparent enamels are vitreous compounds, the composition of which varies according to the amount of fusibility required and which are colored by a few hundredths of oxides. Blues are supplied by oxide of cobalt; greens by protoxide of copper; reds by gold; opaque enamels, yellow or white, owe their color and opacity either to antimony or to arsenic or stannic acids, together or alone. It had, however, been found impossible to utilize these enamel substances in the decoration of European porcelain, owing to the fact that they scaled off; and when the Chinese colors (as sent by MM. Itier and Ly) were experimented upon at Sèvres, they did precisely the same thing. When placed upon Chinese porcelain, however, they developed at a temperature below that used at the Sèvres manufactory for retouching flowers, and did not scale. The explanation is no doubt to be found in the fact that the paste of Chinese porcelain being more fusible than the European, the glaze must also be more easily fusible, and the lime introduced into it to increase the fusibility adapts it in some manner for closer union with the compounds forming the enamel.

If, then, the appearance of Chinese porcelain differs from that of European productions, if the harmony of their paintings offers greater variety, it is the necessary result of the process employed in China. All the colors used contained but little coloring matter and have no worth unless applied in a depth which gives to their paintings a relief impossible to obtain by other means. The harmony of their decoration results from the nature and composition of their enamels.

CATALOGUE.

1. *Small dish for washing pencils*, square, with upright sides, of white Sung dynasty (A. D. 960 to 1259) porcelain coarsely crackled. Height, $\frac{3}{4}$ inch; diameter, $2\frac{3}{4}$ inches.
2. *Low vase for washing pencils*, square, with sides bellying outwards from mouth downwards, having two four-footed lizards with long curled tails moulded in relief cramped on rim, and heads looking into trough, of white Sung dynasty porcelain covered with stone-colored glaze. Height, $1\frac{1}{2}$ inches; diameter, 3 inches and $3\frac{1}{2}$ inches.
3. *Plate* of white Chünchou porcelain (*Chün-yao*) of Yüan dynasty (A. D. 1260 to 1349), covered with glaze of duck's egg blue, of lighter tint at edge and brim, from which glaze has run, with large irregular splotches of claret red, shading into purple at edges, where it mixes with blue color of the body. Diameter, $7\frac{3}{4}$ inches.

4. *Low dish* of white porcelain with open-work edge formed by intersecting circles; decoration *inside*, six medallions, of dragons *fêng huang*, and formal designs joined by conventional foliage; *outside* a light pattern in blue. Mark on foot, *Ta-ming-zung-lo-nien-chih*. "Made during the Yunglo period (1403 to 1424) of the Ming dynasty;" style of decoration and of writing in the date; mark shows it, however, to be of Japanese manufacture. Diameter, 9½ inches.

The *lung* or dragon is the chief of the four Chinese supernatural beasts, the other three being the *fêng huang* (usually translated phoenix), the *ch'ilin* (usually translated unicorn), and the tortoise. It is usually represented with scowling head, straight horns, a scaly, serpentine body with four feet armed with formidable claws; along the length of the body runs a line of bristling dorsal spines, and on the hips and shoulders are flame-like appendages. The claws appear to have originally numbered three on each foot, but the number has in subsequent ages been increased to five. The *Shuo-wên*, a dictionary published in the second century A. D., states that of the three hundred and sixty scaly reptiles the dragon is the chief. It wields the power of transformation and the gift of rendering itself visible or invisible at pleasure. In spring it ascends to the skies and in autumn it buries itself in the watery depths. The watery principle in the atmosphere is essentially associated with the *lung*, but its congener, the *chiao-lung*, is inseparably connected with waters gathered upon the surface of the earth. A denizen of such waters is also the variety *p'an-lung*, which does not mount to Heaven. There is also a species of hornless dragon—the *chin-lung*. Kuan Tz'u (seventh century B. C.) declares that "the dragon becomes at will reduced to the size of a silk-worm or swollen till it fills the space of Heaven and earth. It desires to mount, and it rises till it affronts the clouds; to sink, and it descends till hidden below the fountains of the deep." The early cosmogonists enlarged upon the imaginary data of previous writers, and averred that there were four distinct kinds of dragons proper—the *t'ien-lung* or celestial dragon, which guards the mansions of the gods and supports them so that they do not fall; the *shên-lung* or spiritual dragon, which causes the winds to blow and produces rain for the benefit of mankind; the *ti-lung* or dragon of earth, which marks out the courses of rivers and streams; and the *fu-ts'ang-lung* or dragon of hidden treasures, which watches over the wealth concealed from mortals. Modern superstition has further originated the idea of four dragon kings, each bearing rule over one of the four seas which form the borders of the habitable earth. The *huang-lung* or yellow dragon is the most honored of the tribe; and this it was, which, rising from the waters of Lo, presented to the eyes of Fuhsi the elements of writing (see No. 36). The dragon, as chief among the beings divinely constituted, is peculiarly symbolical of all that pertains to the Son of Heaven—the Emperor, whose throne is termed *lung-wei*, the dragon-seat, and whose face is described as *lung-yen*, the dragon-countenance (see Mayer's Chinese Readers' Manual No. 451). At his death the Emperor is believed to be borne by dragons to the regions of the blessed. The dragon thus intimately associated with the Emperor is always depicted with five talons on each claw, and it is he alone, properly speaking, who can use such a device upon his property; the dragon borne by the princes of the blood has but four talons on each claw. The distinction, however, is not at present rigidly maintained, and the five-clawed dragon is met with embroidered on officers' uniforms.

"In Chinese Buddhism," says Dr. Anderson, in his "Catalogue of Japanese and Chinese Paintings in the British Museum," "the dragon plays an important part, either as a force auxiliary to the law, or as a malevolent creature to be converted or quelled. Its usual character, however, is that of a guardian of the faith under the direction of Buddhas, Bôdhisattvas, or Arhats. As a dragon king it officiates at the baptism of S'âkyamuni, or bewails his entrance into Nirvâna; as an attribute of saintly or divine personages it appears at the feet of the Arhat Panthaka, emerging from the sea to salute the goddess Kuanyin, or as an attendant upon or alternative form of Sarasvâti, the Japanese Benten; as an enemy to mankind it meets its Perseus and St. George in the Chinese monarch K'ao Tsu (of the Han dynasty), and the Shinto God, Susanô no Mikoto. * * * As to the origin of the relation of the Cobra to Indian Buddhism, there appears to be little doubt that the Cobra kings represented a once hostile Scythic race of serpent-worshippers which first invaded India in the seventh century B. C., and that a subsequent alliance with portions of the foreign tribes gave rise to the stories of converted Nâgas, and of Nâgas who defended the faith. When the religion made its way into China, where the hooded snake was unknown, the emblems shown in the Indian pictures and graven images lost their force of suggestion, and hence became replaced by a mythical but more familiar emblem of power. The multiplication of the cobra-head seen in the Âmravâti topos becomes lost in Chinese Buddhism, but perhaps may be traced in the seven-headed dragons and serpents of Japanese legend. The high position occupied by the dragon in Chinese imagination may perhaps be a relic of ancient serpent-worship in that country. Illustrations of the identity of the dragon and serpent in Japanese art and the portrayal of creatures in transitional forms between the two are suggestive of such an origin.

Fêng, the name of the male, and *huang*, of the female, of a fabulous bird of wondrous form and mystic nature, the second among the four supernatural creatures. The compound of the two *fêng-huang* is the generic designation usually employed for the bird, and is frequently translated "phoenix." One writer describes it as having the head of a pheasant, the beak of a swallow, the neck of a tortoise, and the outward semblance of a dragon, to which another version adds the tail of a fish, but in pictorial representations it is usually delineated, as here, as a compound of a peacock and a pheasant, with the addition of many gorgeous colors. Very early legends narrated that this bird made its appearance as a presage of the advent of virtuous rulers, whose presence it also graced as an emblem of their auspicious government. It sat in the court of Huang Ti, who is credited with having entered upon a reign of one hundred years in B. C. 2697, while that sovereign observed the ceremonial fasts; and, according to the Classic of History, it came with measured gambblings to add splendor to the musical performances conducted by the great Shun (B. C. 2255 to 2206). The five colors of its plumage are supposed to be typical of the five cardinal virtues. As the *lung* or dragon has become the emblem of the emperor so the *fêng-huang* has become that of the Empress.

- 5-8. *Tea-cups* (4), with everted rim, of pure white, thin Hsüantê (1426 to 1435) porcelain, with very delicate flower pattern from which the paste has been excised and replaced by thin film of glaze to render it capable of holding liquid. Beautiful specimens of this style of decoration generally known in English as "lace-work"—the *pièces réticulées* of the French. Mark on foot *Ta-ming-hsüan-tê-nien-chih*, "Made during the Hsüantê period of the Ming dynasty."

9. *Small fish-bowl* of Hsüantê white porcelain, with ornamentation of *mang* or unhorned dragons with pointed head among very conventional clouds, and geometrical pattern above running round brim, all incised in paste below a pale-green or celadon glaze. Mark on foot *Ta-ming-hsüan-tê-nien-chih*, "Made during the Hsüantê period of the Ming dynasty." Height, $6\frac{3}{4}$ inches; diameter, 8 inches.

The *mang* would appear to be properly a huge serpent or boa-constrictor.

In paintings, however, and in sculpture it is usually represented as a lizard having a scowling head, with a beard at times depending from the chin, and four feet bearing claws but without talons. On the *mang-p'ao*, i. e., *mang* robe, the court dress, no *mang*, properly speaking, appears, its place being taken by a four clawed or taloned dragon.

10. *Tall vase*, in shape of bag, with long neck bound around with a ribbon tied in bow, of Ch'ênghua (1465 to 1487) white porcelain covered with a yellow-black glaze. Height, $13\frac{1}{4}$ inches; diameter, $7\frac{3}{8}$ inches.
11. *Slender vase* of pure white Ch'ênghua porcelain; decoration, immortals or genii engaged in literary contests and attended by servants in rocky valley, with bamboo thickets painted in bright-blue under glaze. Mark *Ta-ming-ch'êng-hua-nien-chih*, "Made during the Ch'ênghua period of the Ming dynasty." Height, $10\frac{1}{4}$ inches.
134. *Pencil-holder*, circular in shape and very broad, of white Ch'ênghua porcelain; decoration, which is in beautiful shade of blue under transparent glaze—a long poem from the pen of the celebrated poet Li Tai-po, of the Sung dynasty, inculcating the epicurean philosophy, which may be summed up in Horace's words, *Carpe diem, quam minime credula postero*. The advice contained in the poem is being put into practice by a merry party round the festive board, whose actions seem to express the words of the Latin author, *Fruamur bonis quæ sunt; pretioso vino et unguentis nos impleamus, non prætereant nos flos temporis*. No mark. Height, 6 inches; diameter, $6\frac{3}{8}$ inches.
12. *Small bowl* to hold flowers or water for use on ink slab, of white Ch'êngtê (1506 to 1521) porcelain, covered outside with milky blue glaze, inside plain, coarsely cracked inside and out. Mark *Ta-ming-ch'êng-tê-nien-chih*, "Made during the Ch'êngtê period of the Great Ming dynasty." Height, $2\frac{1}{4}$ inches; diameter, $4\frac{1}{2}$ inches.
13. *Jar*, of *potiche* shape, of Wanti (1573 to 1619) white porcelain; decoration, flying *fenghuang* and dragons (see No. 4), with flowers between, and above a border of formal pattern, resembling inverted spear-heads; cover has small pattern running round it with dragon on top; ornamentation throughout is engraved in paste and of bright yellow upon a vivid-green ground. Mark *Ta-ming-wanti-nien-chih*, "Made during the Wanti period of the Great Ming dynasty." Height, $6\frac{1}{2}$ inches; diameter, $6\frac{1}{2}$ inches.
- 14, 15. *Bowls* (2), with scalloped brim, of white porcelain decorated with red and gold plum-blossoms, alternating with gourd-shaped vases having a decoration in gold on a blue ground or formal flowers, resembling pinks and chrysanthemums in white, red, and gold, or all gold, upon a salmon-colored ground, with long twisted ribbons attached, the decoration passing from outside over the brim to inside, where at bottom, confined by a double circle, is a blue dragon in white, green, and red clouds. Round foot on outside is small pattern. Marked as last, but decoration and calligraphy of date mark show the ware to be of Japanese manufacture. Height, $3\frac{1}{4}$ inches; diameter, $7\frac{3}{8}$ inches.
- 16, 17. *Jars* (2), circular in shape, the walls rising perpendicularly, of Ming dynasty porcelain, decorated with iris and leaves boldly outlined in relief and covered with thick glazes of different colors, the flowers being yellow and the

leaves peacock-green upon a deep aubergine ground; brim green, with a formal panel pattern outlined in relief round neck and colored alternately with same deep glaze (yellow and peacock-green), inside thin peacock-green glaze. Good specimen of this highly-prized ware. No mark. Height, $6\frac{1}{2}$ inches; diameter, $6\frac{3}{4}$ inches.

18. *Jar* of white porcelain of Ming dynasty, of either Hsiântê (1426 to 1435) or Ch'ênghua (1465 to 1487) period. Decoration, Pei-tow (the Northern Pole star) and Nan-tow (the Southern Pole star) playing chess on mountain road, with boy bearing a bundle of dry branchlets, and an inscription in seal character, "Among the hills a thousand years seem but as seven days." Landscape and figures in beautiful deep blue under glaze and in pale and dark green enamel colors. Above, a formal pattern encircles the jar below the neck, round which are small sprays of flowers in brick-red with leaves alternately green and blue.

This represents the well-known legend of Wang Chih, who, having wandered in the mountains of Ch'üchow to gather fire-wood, came upon two aged men, the Southern Pole star, the genius of longevity, and the Northern Pole star, the genius of death, intent upon a game of chess. He laid down his ax and watched their game, in the course of which the former handed him something resembling a date-stone, which he was told to place in his mouth. No sooner had he tasted it than he became oblivious of hunger and thirst. After sometime the donor turned to him and said, "It is long since you came here; you should go home now." Whereupon Wang Chih, proceeding to pick up his ax, found that the handle had moldered into dust. On reaching his home he found that centuries had elapsed since the time when he left it for the mountains, and that no vestige of his kinsfolk remained. Retiring to a retreat among the hills he devoted himself to the rites of Taoism, and finally attained to immortality.* Wang Chih is stated to have lived under the Chin dynasty in the third century B. C. The appearance of this South Pole star is supposed to announce peace throughout the world.

- 19, 20. *Jars* (2) with covers, of the small *potiche* shape, of pure white porcelain, with paintings in deep, dull blue under glaze, of children playing in garden and plucking flowers from the trees; cover ornamented with children, similarly painted, in grotesque attitudes playing. A reproduction of a popular Chinese painting, the Po-tzu'-t'u, "Drawing of (*lit.* a hundred) Children." Mark on foot, a leaf, which makes these specimens date from the K'anghsi period (1662 to 1722), though the color is rather that of the Ming dynasty. Height, 10 inches.
21. *Wine-pot* of creamy white Ming dynasty Chienning porcelain (*Chien-yao*), termed by the French *blanc de Chine*. Tall, circular in shape, tied at center with ribbon. Spout formed by lizard with four legs and branching tail, which clings to rim and turns head outward, the wine issuing from its mouth. The handle is formed by a similar animal twisting head downwards from rim to center of vessel. Has closely fitting cover, surmounted by a knob formed of a diminutive lizard curled into the form of a ball. No mark on foot. Height, $9\frac{1}{2}$ inches; diameter, $3\frac{1}{2}$ inches.
- 22-24. *Seals* (3) of creamy-white Ming dynasty Chienning porcelain (*blanc de Chine*), one large and two smaller, cubes in shape, each surmounted by a lion as handle boldly molded in relief, with long, straight mane and tail, and curly hair down back. Nos. 22 and 24 represent a lioness with one cub. No mark. Height, Nos. 22 and 23, $2\frac{3}{4}$ inches, No. 24, 3 inches; diameter, Nos. 22 and 23, $1\frac{1}{2}$ inches, No. 24, $1\frac{1}{4}$ inches.

25. *Pencil-holder*, tall, circular in shape, of pure-white Ming dynasty porcelain, formed of sprays of lotus flowers and leaves admirably molded in relief and covered with lustrous, transparent glaze, the spaces between the flowers and leaves being excised to form open-work. No mark; bottom unglazed. Height, $3\frac{3}{4}$ inches; diameter, $2\frac{1}{2}$ inches.
171. *Pencil-washer* of white Ming porcelain, of globular form, with low, open neck, and a handle on either side formed of a grotesque lion's head molded in relief. Decoration consists of six genii riding on a sword, a carp, a tiger, a hat, a bunch of sticks, and a dragon, painted in deep blue through brick-red waves under glaze. Round neck and foot a narrow band of white studded with blue spots. Mark *Ts'ai-hua-t'ang*, the designation of a portion of some princely palace not yet identified. Height, $2\frac{3}{4}$ inches; diameter, $3\frac{1}{2}$ inches.

The sage riding the waves upon the sword is Lü Fung-pin, stated to have been born A. D. 755. While holding office as magistrate of Tê-hua, in modern Kiangsi, he is said to have met the immortalized Chung li Ch'üan, who instructed him in the mysteries of alchemy. On his subsequently begging to be allowed to convert his fellow-countrymen to the true belief, he was, as a preliminary, exposed to ten temptations, which he successfully resisted. He was then invested with the formulas of magic and a sword of supernatural power, as the Taoist legends relate, with which he traversed the empire during a period of four hundred years, killing dragons and ridding it of divers kinds of evils. In the twelfth century temples were erected to his honor under the title of Ch'un Yang. (Mayers, No. 467.)

He of the carp is Kin-Kao, "a sage who lived in northern China about the twelfth century. It is said that he wandered over the province of Chihli for two centuries, and then, taking leave of his disciples with a promise to return by a certain day, he plunged into the river. When the appointed time for his re-appearance arrived, the pupils, with a great multitude, assembled upon the banks, and, having duly bathed and purified themselves, made offerings to him. At length, in the sight of ten thousand persons, he sprang from the water riding upon a carp. After tarrying with his friends for a month he again entered the river and was seen no more."*

The sage on the tiger is perhaps Chü Ling-jeu, a rishi of marvelous powers.

He on the bundle of sticks is perhaps Damma, son of a king in southern India, "who," says Mr. Anderson in his catalogue, p. 511, "was the first Chinese patriarch. He arrived in China A. D. 520, and established himself in a temple in Lozang. During nine years of his stay there he remained buried in profound abstraction, neither moving nor speaking, and when he returned to consciousness of his surroundings his legs had become paralyzed by long disuse. In the *Butsu-zo-dzu-i* it is said he came to Japan A. D. 613, and died on Mount Kataoka. The Chinese, however, maintain he died and was buried in China, but that three years after his death he was met traveling toward India, with one foot bare, and when his tomb was opened by the emperor's order it was found empty save for a cast off shoe."

The dragon genius is Ch'ên Nan, a sage possessed of supernatural powers to cure the sick, transmute metals, travel enormous distances, etc. Passing through a place where the inhabitants were praying for rain he stirred a pool where he knew a dragon lived, with a long iron pole. So plentiful a downpour at once ensued that all the rivers were filled.

*Anderson: "Japanese and Chinese Paintings in British Museum," p. 236.

172-175. *Plates* (4 small) of white Ming dynasty porcelain, decorated inside, the genius of longevity accompanied by the spotted stag, amid waves and clouds in deep blue upon brick-red waves. On the outside are the eight immortals venerated by the Taoist sect, in blue or vermilion waves. Mask as on last. The decoration shows them to have been intended to hold sweetmeats during birthday ceremonies.

The eight immortals venerated by the Taoists are Chung-li Ch'üan, Chang Kuo, Lü Tung-pin, Ts'as Kuo-ch'üan, Li Tieh-kuai, Han Hsiang-tz'u, Lan Ts'ai-ho, and Ho Hsien-ku. Though some, if not all, of these personages had been previously venerated as immortals in Taoist legends, it would appear from the *K'ê-yü-ts'ung-k'ao* (ch. 34) that their defined assemblage into a group of immortalized beings can not claim a higher antiquity than the Yüan dynasty, *i. e.*, the end of the thirteenth or beginning of the fourteenth century.

Chung-li Ch'üan is reputed to have lived under the Chou dynasty (B. C. 1122 to 256). Many marvelous particulars are narrated respecting his birth and career, in the course of which he met Tung Hua Kung, the patriarch of the Genii, "who revealed to him the mystic formula of longevity and the secret of the power of transmutation and of magic craft." He was eventually permitted to join the Genii, and has appeared from time to time as the messenger of Heaven. He is usually represented as a martial figure with a sword.

Chang Kuo is said to have flourished towards the close of the seventh and middle of the eighth century. Leading an erratic life, he performed wonderful feats of necromancy. His constant companion was a white mule which could carry him thousands of miles in a single day, and which, when he halted, he folded up and hid away in his wallet. When he again required its services, he spurted water upon the packet from his mouth and the animal at once resumed its proper shape. According to Taoist legend, the Emperor Hsüan Tsung, of the T'ang dynasty, repeatedly urged him to visit his court and assume a priestly office there, but the ascetic wanderer rejected every offer. He is reputed to have entered immortality about 740 A. D. without suffering bodily dissolution. He is usually represented conjuring his mule from a wallet or gourd, or holding an instrument of music.

Lü Tung-pin said to have been born A. D. 755. While holding office at Tê-hua, in modern Kiangsi province, he is reputed to have met Chung-li Ch'üan (see *ante*) among the Lu mountains, and was instructed by him in the mysteries of alchemy and the magic formula of the elixir of life. Having expressed a desire to convert his fellow-men to the true belief, a series of temptations, ten in number, was imposed upon him as a preliminary. These he successfully overcame, and was thereupon invested with the formulas of magic and a sword of supernatural power, with which he traversed the Empire during a period of four hundred years, slaying dragons and ridding it of various kinds of evils. In the twelfth century temples were erected to him under the title of Ch'un Yang. Like Chung-li Ch'üan, he is usually depicted as of martial bearing, armed with a sword.

Of Ts'as Kuo-ch'üan little is known. He is reputed to have been the son of Ts'ao Pin, the great military commander, who largely contributed to the establishment of the Sung dynasty upon the throne of China, and the brother of the Empress Ts'ao of the same dynasty. He would thus have lived in the eleventh century. He is usually represented as a military officer, holding a pair of castanets.

Li T'ieh-kuai, or T'ieh-Kuai-Tsien-Shéug, *i. e.*, "Li of the Iron Staff," or "the gentleman of the Iron Staff." His birth is assigned to no precise era; his name, however, is stated to have been Li, and he is described as of commanding stature and of dignified mien. He was entirely devoted to the study of Taoist lore, his instructor having been the philosopher Lao Tz'u himself, who for that purpose descended at times from Heaven, and at others summoned his pupil to his celestial abode. "On one occasion, when about to mount on high," says the legend as given by Mayers (No. 718), "at his patron's bidding the pupil, before departing in spirit to voyage through the air, left a disciple of his own to watch over his material soul (*p'ò*), with the command that if, after seven days had expired, his spirit (*hun*) did not return, the material essence might be dismissed into space. Unfortunately, at the expiration of six days the watcher was called away to the death-bed of his mother, and, his trust being neglected, when the disembodied spirit returned on the evening of the seventh day it found its earthly habitation no longer vitalized. It, therefore entered the first available refuge, which was the body of a lame and crooked beggar whose spirit had at that moment been exhaled, and in this shape the philosopher continued his existence, supporting his halting footsteps with an iron staff." Li T'ieh-kuai is, in consequence, usually depicted as a lame and ragged beggar exhaling his spiritual essence in the form of a shadowy miniature of his corporeal form, or conjuring five bats, symbolical of the five kinds of happiness (see No. 27) from a gourd.

Han Hsiang-tz'u is reputed to have been the grandson of the famous statesman, philosopher, and poet of the T'ang dynasty, and to have lived in the latter half of the ninth century. He was an ardent votary of transcendental study, and the pupil of Lü Tung-pin (see *ante*), himself one of the immortals, who appeared to him in the flesh. Having been carried up into the peach-tree of the Genii (see Nos. 27 and 28), he fell from its branches, and in falling entered into immortality. He is usually depicted playing upon a flute or sitting upon a portion of the trunk of a peach-tree.

Lan Ts'ai-ho is of uncertain sex, but usually reputed a female. The *t'ai-p'ing-Kuang-chi* states that she wandered abroad clad in a tattered blue gown, with one foot shoeless and the other shod, in summer wearing a wadded garment next the skin, and in winter sleeping amid snow and ice. "In this guise," says Mayers, "the weird being begged a livelihood in the streets, waving a wand aloft and chanting a doggerel verse denunciatory of fleeting life and its delusive pleasures." Lan Ts'ai-ho is usually drawn as an aged man or as a female clad in leaves or rags, carrying a basket, (?) to hold the alms given.

Ho Hsien-Ku was the daughter of one Ho T'ai, a native of Tsêng-ch'êng, near Canton, and was born in the latter half of the seventh century. Born with six hairs growing on the top of her head, she at fourteen years of age dreamed that a spirit visited her and instructed her in the art of obtaining immortality by eating powdered mother-of-pearl. She complied with this injunction and vowed herself to a life of virginity. Her days were henceforth passed in solitary wanderings among the hills, among which she moved as on wings, to gather herbs, and eventually renounced all mortal food. Her fame having reached the ears of the Empress Mu, a concubine endowed with a masterful intellect, who succeeded in usurping the sovereign power,

and who, but for a revolution, would have deposed the dynasty of T'ang, she was summoned to court, but vanished from mortal sight on her way thither. She is said to have been seen once more, in A. D. 750, floating upon a cloud at the temple of the Taoist immortal Ma-Ku, and again some years later near Canton. She is sometimes represented clothed in a mantle of mugwort leaves and holding a lotus-flower.

26. *Bowl* of white K'anghsi (1662 to 1722) porcelain, with scalloped edges dividing the vessel into eight flattened sections, each filled with a scene admirably painted, chiefly in blue, but with small details in enamel green, on a ground inside and out of deep yellow under thick transparent glaze. These paintings are copies from celebrated pictures, drawn by a famous artist named Fei of the Yüan dynasty, *i. e.*, latter half of the twelfth or early in thirteenth century, illustrative of the pleasures of the *Hsi-yüan* or Western Park. At bottom inside, a man holding a jar, also in blue. An admirable specimen of a highly prized ware. Mark *Ta-ch'ing-K'ang-hsi-nien-chih*, "Made during the K'anghsi period of the Great Pure or Ch'ing (the present) dynasty." Height, $3\frac{3}{4}$ inches; Diameter, $7\frac{5}{8}$ inches.

Of this ware the "Ambassade de la Compagnie Orientale des Provinces Unis vers l'Empereur de la Chine ou Grand Can de Tartarie fait par les Sieurs Pierre de Goyer et Jacob de Keyser" (Leyden, 1665), and the "Travels from Muscovy to China, by E. Ysbranti Ides, Ambassador from Peter the Great to the Emperor of China in 1692" (published in Harris's "Collection of Voyages"), say: "The finest, richest, and most valuable china is not exported, at least very rarely, particularly a yellow ware, which is destined for the imperial use, and is prohibited to all other persons."

The *Hsi-Yüan* was a park laid out by Yang Ti (A. D. 605 to 616) of the Sui dynasty. It was over 60 miles in circuit, and "exhausted the utmost degrees of splendor and beauty. When the foliage became decayed and fell, it was replaced upon the trees by leaves of silk. Here the imperial *débauché* was accustomed to ride on moonlit nights, accompanied by a cavalcade of thousands of the inmates of his seraglio." (Mayers.)

27. *Bowl* of pure white K'anghsi porcelain, wide spreading, decorated on *outside* with mythological subjects admirably painted in great detail and with great delicacy of brush in the characteristic tones of the latter half of this reign. Vermilion-red and enamel colors. *Inside* a branch of the peach-tree, bearing one fruit and several leaves, in green shaded and varied with darker tints of the same color, with the exception of two, which show a great variety of shades of decay, the veins alone remaining in parts; on the peach, which, as here, is usually pointed in China, is the character *Shou*, longevity, in the "seal" style in gold. An almost unique specimen of the highest style of decoration during the period when the manufacture of porcelain had reached its highest point.

This bowl from its decoration was undoubtedly intended for use in the palace on the occasion of an imperial birthday. The peach is one of the emblems of longevity, from a legend which traced them to the gardens of the fairy Hsi Wangmu, where they ripened but once in three thousand years, and conferred that term of life upon those who were fortunate enough to taste them. The legend runs thus: "In the first year of the period Yüan fêng in the Han dynasty (B. C. 110) the fairy Hsi Wang had descended from her mountain realm to visit the Emperor Wu Ti, bringing with her seven peaches. She ate two of the number, and, upon the Emperor expressing a wish to preserve the seed, she told him that the tree from which they came bore once

only in three thousand years, but each fruit conferred three centuries of life upon the eater. At that moment she perceived Tung Fang—peeping at her through the window, and so, pointing to him, said: 'That child whom you see yonder has stolen three of my peaches and is now nine thousand years old.'"^{*} The gum of the peach-tree mixed with mulberry ash is used as an *elixir vite* by the Taoists.[†]

The decoration on the outside is an adaptation of the allegorical representation of the prayer for "happiness, distinction, and longevity" (*fu-lao-shou*), met with in Chinese paintings under many forms, but always with the same general characteristics. One of the immortals, the great sage Lao Tz'u, accompanied by attendants, the crane (*Grus viridirostris* Veillot), the stag, the hairy tortoise, all emblems of long life; another, Li 'Tieh-Kuai, with attendants, evolving from a gourd contracted at the center, five bats, emblematic of the five blessings—longevity, riches, peacefulness and serenity, the love of virtue, and an end crowning the life—the Chinese characters for *bat* and *happiness* having the same pronunciation.

23-31. *Plates* (4) of white porcelain. Hsi Wang Mu, depicted as a beautiful female in the ancient Chinese dress, is represented accompanied by one of her attendant maidens holding a tray containing peaches and other articles, and by the spotted stag, symbolical of longevity, very delicately painted in enamel colors. The rim is ornamented with a narrow band in vermilion red of detached flowers of the Chinese peony (*Paeonia Moutan*) and of butterflies. Mark *Ta-Ming-ch'eng-hua-nien-chih*, "Made during the Ch'enghua period (1465 to 1487) of the great Ming or Bright (dynasty);" the colors and style of painting, however, point rather to the K'anghsi period as that of their manufacture. Diameter, 6½ inches.

Hsi Wang Mu, literally Royal Mother of the West, is the legendary queen of the Genii, who is supposed to have dwelt in a palace in Central Asia among the K'unlun Mountains, where she held court with her fairy legions. Upon some slight allusions to this personage in earlier works the philosopher Lieh Tz'u, in the fifth century, B. C., based a fanciful and perhaps allegorical tale of the entertainment with which King Mu of the Chou dynasty was honored and enthralled by the fairy queen during his famous journeyings B. C. 985. In later ages the superstitious vagaries of the Emperor Wu Ti of the Han dynasty gave rise to innumerable fables respecting the alleged visits paid to that monarch by Hsi Wang Mu and her fairy troop; and the imagination of the Taoist writers of the ensuing centuries was exercised in glowing descriptions of the magnificence of her mountain palace. Here, by the borders of the Lake of Gems, grows the peach-tree of the Genii, whose fruit confers the gift of immortality, bestowed by the goddess upon the favored beings admitted to her presence, and hence she dispatches the azure-winged birds, *Ch'ing-niao*, which serve, like Venus' doves, as her attendants and messengers. In process of time a consort was found for her in the person of Tung Wang Kung, or King Lord of the East, whose name is designed in obvious imitation of her own, and who appears to owe many of his attributes to the Hindoo legends respecting India. By the time of the Sung dynasty (the tenth century, A. D.) a highly mystical doctrine respecting the pair, represented as the first created and creative results of the powers of nature in their primary process of development, was elaborated in the *Kuang-Chi*. The more sober research of modern writers leads to the suggestion that Wang Mu was the name either of a region or of a sovereign in the ancient West.*

* *Mayers: Op. cit., No. 572.*

† *Ibid., No. 707.*

- 32, 33. *Bowls* (a pair), everted, of thin white K'anghsi porcelain decorated with the eighteen *Lohan* or *Arhats* in groups, very delicately painted in vermillion. Mark as in No. 26. Height, $2\frac{3}{8}$ inches; diameter, 6 inches.

In his "Hand-book of Chinese Buddhism," Dr. Eitel states that the original meaning of *Arhat* ("deserving") is overlooked by most Chinese commentators, who explain the term as though it were written *Arihat*, "destroyer of the enemy," i. e., of the passions, and "not to be re-born," i. e., exempt from transmigration. A third explanation, based on the original conception, is "deserving of worship." The *Arhat* is the perfected *Arya*, and can therefore only be attained by passing through the different degrees of saintship. It implies the possession of supernatural powers, and is to be succeeded either by Buddhahip or by immediate entrance into Nirvana. In popular acceptation, however, it has a wider range, designating not only the perfected saint, but all the disciples of S'âkyamuni, and thus it includes not only the smaller circles of eighteen and five hundred disciples, but also the largest circle of one thousand two hundred.

The first Sûtra (that of forty-two sections) was translated into Chinese in the year A. D. 67, during the time of the Later or Eastern Han dynasty, whose capital was at Loyang in Honan province, by Kâs'ya-pa Mâtanga, a disciple of S'âkyamuni, who entered China with Han Ming-ti's embassy on its return from Badakshan. By its means the Buddhist doctrines first became known in China. Such translations from the Sanskrit form the earliest and still continue to be the most important part of Chinese Buddhistic literature; but from the fifth century onward they have been supplemented by original compositions in the Chinese language from the pens of native adherents to that religion. During the first eight centuries of the existence of the Buddhistic religion in China the smallest circle of S'âkyamuni's disciples comprised the same number as in India, sixteen, which was increased under the T'ang dynasty, in the ninth century, A. D., by the enrollment of two additional disciples to its present complement in China—eighteen.

- 34, 35. *Bowls* (2), everted, of thin white K'anghsi porcelain. Replicas of Nos. 32, 33, but of larger size. Mark, same as in No. 26. Diameter, $6\frac{1}{8}$ inches.
36. *Wine-cup*, tall, everted, of thin white K'anghsi porcelain; ornamentation: Between borders of Grecian pattern are diamond-shaped panels containing the *pa-kua*, in deep-blue under transparent glaze. Mark, as above. Height, 3 inches; diameter, $3\frac{1}{8}$ inches.

The *pa-kua*, or eight diagrams, are the combinations which may be formed of threelines, whole or divided into two equal parts. They are stated to have been developed by Fuh-hi, the legendary founder of Chinese polity, who is believed to have lived from B. C. 2852 to 2738 by aid of a plan or arrangement of figures revealed to him on the back of a "dragon-horse." These eight figures, which can be traced back to the two primary forms representing the first development of the *Yin* and *Yang* (the primordial essences) from the Ultimate Principle, together with certain presumptive explanations attributed to Fuh-hi, were the basis, according to Chinese belief, of an ancient system of philosophy and divination during the centuries preceding the era of Wên Wang (twelfth century B. C.), but of which no records have been preserved beyond the traditional names of its schools. Wên Wang, the founder of the Chou dynasty, while undergoing imprisonment (B. C. 1144) at the hands of the tyrant Shou, devoted himself to study of the diagrams, and appended to each of them a short ex-

planatory text. These explanations, with certain amplifications by his son, Chou Kung, constitute the work known as the "Book of Changes" of the Chou dynasty, which, with the commentary added by Confucius, forms the *Yih Ching*, "the Canon of Changes," the most venerated of the Chinese classics. In this work, which serves as a basis for the philosophy of divination and geomancy, and is largely appealed to as containing not alone the elements of all metaphysical knowledge but also a clue to the secrets of nature and of being the entire system reposed upon these eight diagrams, a ceaseless process of revolution is held to be at work, in the course of which the various elements or properties of nature indicated by the diagrams mutually extinguish and give birth to one another, thus producing the phenomena of nature.*

37. *Vase* of white K'anghsi porcelain, in the shape of a gourd contracted in the middle (*hu-hu*), having a vine trailing over it, from which hang large bunches of grapes on which a squirrel is feeding, in various shades of blue under a transparent glaze. Mark, as above. Height, $4\frac{7}{8}$ inches.

This is a well-known Chinese motive. "The first picture of the squirrel and the vine" (says Anderson, catalogue of Japanese and Chinese paintings in the British Museum, No. 747); "appears to have been painted by Wing Yüan-chang, a famous artist of the Sung dynasty, A. D. 960 to 1259, and has been repeated by innumerable copies in China and Japan."

- 38, 39. *Plates* (a pair) of white K'anghsi, having a large-sized character in center, believed to be Thibetan, surrounded on the sides by three concentric lines of smaller characters of similar type; on outside are three similar lines of characters in deep blue under transparent glaze. Mark, as above. Diameter, $5\frac{3}{8}$ inches.

- 40, 41. *Bowls* (a pair) of thin white K'anghsi porcelain. Ornamentation on outside consists of a delicately-drawn band of waves on lower portion where bowl springs from foot, with the *pa-kua* or eight diagrams (see No. 36) above. Inside, within double circle, at bottom, the *yin* and *yang*, all in deep blue under transparent glaze. Mark, as above. Height, $2\frac{3}{4}$ inches; diameter, $4\frac{3}{4}$ inches.

The circle represents the ultimate principle of "being," which is divided by a curving line into two equal portions, the positive and negative essences, *yang* and *yin*, respectively. *Yang*, the more lightly colored portion, corresponds to light, heaven, masculinity, etc.; *yin*, the more darkly colored, to darkness, earth, femininity, etc. To the introduction of these two essences are due all the phenomena of nature.

- 42, 43. *Bowls* (a pair), small, everted, of white K'anghsi porcelain, plain inside. Decorated on outside with iris, grasses, longevity fungus (*ling chih*, a species of (?) polyporus), tea-roses, and other flowers delicately painted in enamel colors upon a brick-red or vermilion ground. Mark, *K'ang-hsi-zü-chih*, "Made by special order of Emperor K'anghsi." Height, $2\frac{1}{4}$ inches; diameter, $4\frac{1}{4}$ inches.

- 44, 45. *Plates* (a pair) of white K'anghsi porcelain, having a "sitting" Imperial five-clawed dragon on center, and similar flying dragons (see No. 4) amid clouds around the shelving side. Engraved in the paste under a thick deep-blue glaze (*bleu de roi*) which covers the entire plate inside and out, except the foot, on which appears within a double circle *Ta-ch'ing K'ang-hsi-nien-chih*, "Made during the K'anghsi period of the Great Pure (the present) dynasty." Diameter, $9\frac{7}{8}$ inches.

* Mayers: *Op. cit.*, p. 333.

46. *Bowl*, large, everted, of pure white K'anghsi porcelain, plain inside. On outside is a branch of peach tree bearing fruit and leaves, the latter in all stages from the light green of the newly burst leaf to the brown of the withered and worm-eaten, admirably painted. On the branch is seated a large bird, termed by the Chinese a paroquet, but having a red beak, brown breast, green plumage around neck and below it, with brown on back, and black and gray wings and tail. A fine specimen. Mark, as above. Height, $3\frac{1}{2}$ inches; diameter, $8\frac{1}{4}$ inches.
47. 48. *Wine-cups* (a pair), small, with straight lips, of white K'anghsi porcelain, covered outside with a monochrome dull glaze of violet magenta; plain inside, except at bottom, where are two plums and some beans delicately painted. Mark, as above. Height, $1\frac{1}{8}$ inches; diameter, $3\frac{1}{4}$ inches.
- 49-52. *Bowls* (4), everted, of white K'anghsi porcelain, having Imperial five-clawed flying dragons (v. No. 4) engraved in paste, over which are sprays of roses and plum-blossoms, buds and leaves of various shades of green, open flowers and butterflies alternately yellow and auvergne purple-brown under a transparent glaze. Mark, as above. Height, $2\frac{3}{4}$ inches; diameter, $5\frac{1}{2}$ inches.
53. *Vase*, of square body, contracting to form short, circular, everted neck, on which above each side of the body is the character for "longevity," *shou*, in four out of the hundred forms it may take in the "seal" style of writing. The four sides of the body bear two paintings in the distinctive colors of *la famille verte*, one of the famous club of the seven worthies of the bamboo grove amusing themselves with music, chess, and wine; the other a historical scene representing an ancient general on his way to attack the Man-tz'u, or Southern Chinese, giving audience during a halt upon the banks of the Yangste. Between the paintings are lengthy disquisitions suggested by the subjects of the drawings. As these are dated "the 29th day of the 9th moon of the year of the cyclic characters *Kwei mo*," i. e., 1703, it is justifiable to conclude that is the date of the vase, that being the only year to which these characters would apply during K'anghsi's reign to which the coloring shows it to belong. Mark, a leaf. Height, $18\frac{3}{8}$ inches.

The club of the seven worthies of the bamboo grove was an association of convivial men of letters, formed in the latter half of the third century, who were accustomed to meet for learned discussions and jovial relaxation in a grove of bamboos. The seven worthies were Hsiang Tz'u-Ch'ü; Chi Shu-Zeh, a celebrated functionary and man of letters, but no less renowned as a lover of the wine-cup and as a musician. He was also an ardent devotee of alchemy. Incurring the displeasure of Ss'u-ma Chao, minister of the last sovereign of the house of Wri, he was executed as a propagator of magic arts and heretical doctrines, when he showed his contempt of death by tuning his guitar on the way to execution; Lin Po-lun, who was wholly devoted to joviality and wished he could be accompanied by a gravedigger to at once inter him, should he fall dead over his cups; Shan Chü-yuan, a statesman, under Wu Ti of the T'ang dynasty, celebrated for the patronage he extended to rising talent; Wang Chün-chung, a minister of Hwei Ti of the house of Chin, at once infamous for his avarice and for having intrusted the discharge of his duties to base underlings that he might abandon himself to a life of extravagance and pleasure; Yüan Chung-jung, famous as a lover of music and wine, and as a philosopher studying content and moderation in preference to the ways of ambition; and Yüan Tz'u-tung, uncle of the last, a public functionary, but preferring the quietism preached by the philosophers Lao-Hze and Chuang-Hze, whose follower he professed himself to be, to the toils of public life.*

* Mayers: *Op. cit.*, Nos. 246, 411, 587, 799, 963, 968.

- 54, 55. *Plates* (a pair) of white K'anghsi porcelain, decorated inside with a painting in natural colors of the great Taoist sage and philosopher Lao Yze, with lofty head, seated under a tree; his attendant is preparing writing materials for his use. Round the brim are the eight Buddhistic emblems joined by conventional foliage of natural color, but of paler tones than the central design. Mark, as on No. 44. Diameter, $6\frac{1}{2}$ inches.

Lao Tze was the founder of the Taoist system of philosophy. He is said to have been surnamed Li and named Êrh, but his history is almost altogether legendary. His biography, as given by the great historian Ss'u-ma Chieh, who wrote the first comprehensive survey of the history of China from the legendary period of Huangti down to B. C. 104, contains, however, some particulars which may be considered authentic. According to this account he was the keeper of the records at Lo, the capital of the Chou dynasty, about the close of the sixth century, B. C., and professed a doctrine of abstraction from worldly cares based upon speculations regarding *Tao*, Reason, and *Tê*, Virtue. This excited the curiosity of Confucius, who is said to have visited him and to have retired disconcerted at his bold flights of imagination. The veracity of the statement regarding this meeting is, however, open to doubt. After a long period of service Lao Tze is said to have retired to the West, after confiding to Yin Hsi, the keeper of the frontier pass of Han Ku, a written statement of his philosophy, the *Tao-tê-ching*, or Classic of Reason and Virtue. Later mystics improved upon this account by assigning a period of mythical antiquity and a miraculous conception through the influence of a star to Lao Tze's birth, alleging him to have been the incarnation of the supreme celestial entity. According to the *Lieh-hsien-ch'uan*, an account of the Taoist genii, he became incarnate B. C., 1321, in the State of Ts'u. His mother brought him forth from her left side beneath a plum tree, to which he at once pointed, saying: "I take my surname (namely, *Li*, a plum) from this tree." When born his head was white and his countenance that of an aged man, from which circumstance he derived his name of Lao Tze, the *Old Child*. The remainder of the account resembles that given above, except that he is made to live for centuries, eventually retiring to the West about B. C., 1080. No countenance is given, however, in the writings ascribed to his pen to supernaturalism of any kind, and the legends regarding his life have evidently been largely colored by the accounts given by Buddhistic writers of the life of S'âkyamuni. The ideas contained in the *Tao-tê-ching* of Lao Tze, which has been translated into English, French, and German, are thus summed up by Mr. Mayers (*op. cit.*, No. 336): "Creation proceeding from a vast, intangible, impersonal first principle, self-existent, self-developing, the mother of all things. The operation of this creative principle fulfilled in the nature of man, the highest development of which again is to be sought for in a return through 'quietism' and 'non-action' to the mother principle. The highest good is accordingly to be enjoyed in a transcendental abstraction from worldly cares, or freedom from mental perturbation. In a doctrine such as this it is not difficult to trace at least a superficial likeness to the theories of Brahminism, and whether originally derived from Hindu thought or not it is probable that the cultivation of Lao Tze's teachings had a potent influence in preparing the way for an influx of the metaphysical speculations of Indian philosophers to satisfy a mental craving not provided for in the simple materialism which Confucius expounded. At least the latitude

allowed by the vagueness of Lao Tze's writings both enabled and encouraged his so-called disciples and adherents to graft upon the leading notions of his text an entirely adventitious code of natural and psychical philosophy, which, on the one hand, expanded into a system of religious belief, a simple travesty of Buddhism, and, on the other, became developed into a school of mysticism, founded apparently upon the early secrets of the professions of healing and divination, from whence it rose to occult researches in the art of transmuting metals into gold and insuring longevity or admission into the ranks of the genii. To all these professions and pretensions the title of the religion or teachings of Tao was given, although they were in reality in no wise countenanced by the doctrines of Lao Tze himself. His professed disciples, Lieh Tze and Chuang Tze in the fourth century, and Huai Nan Tze in the second century B. C., progressively developed the mystic element thus introduced, and a notable impetus accrued to it from the superstitious belief with which the pretensions of the alchemists were received by the Emperor, Wu Ti, from whose period onward the reverence paid to the founder of the sect began to assume a divine character." In A. D. 666 he was for the first time ranked among the gods, being canonized by the Emperor as "The Great Supreme, the Emperor of the Dark First Cause," and his title was again enlarged in 1013. The achievement of corporeal immortality having been the chief aim of the sect named after him, the founder, Lao Tze, naturally came to be considered the God of Longevity, and as such he figures in all the paintings symbolical of a prayer for "dignity, happiness, and long life," being usually depicted as an aged man leaning upon a staff, his head being of abnormally lofty proportions.

The *pa-chi-hsiang* or "Eight lucky Emblems" are of Buddhistic origin and derived from India. Formed in clay or of wood, they are offered on Buddhistic altars, and largely enter into the architectural decoration of the temples. They are found with variations both of shape and of detail. In their ordinary form they are:

- (1) A bell (*chung*), or more usually a wheel (*lun*), *chakra*, the wheel of the law, with fillets.
- (2) A univalve shell (*lo*), the chank shell of the Buddhists, with fillets.
- (3) A state umbrella (*san*), with fillets.
- (4) A canopy (*kai*), with fillets.
- (5) A lotus-flower (*lien-hua*), without fillets; sometimes represented as a *Pæonia montan*.
- (6) A vase with cover (*kuan*), with fillets.
- (7) Two fishes (*erh yü*), united by fillets. Said by some to be figurative of domestic happiness.
- (8) An angular knot with fillets, termed *ch'ang*, the intestines, an emblem of longevity.

Another style of decoration, also consisting of eight emblems, is that known as the *pa-pao*, or "eight precious things;" they vary considerably in form, and the explanations of their meaning are unreliable and conflicting. The more usual forms, all of which bear fillets, are:

- (1) an oblate spherical object (*chên*), representing a pearl; (2) a hollow disk inclosing an open square, possibly a copper cask emblematical of riches; (3) an open lozenge, placed horizontally; (4) a lozenge placed horizontally, with a section of a second lozenge in the upper angle; (5) an object resembling in shape a mason's square—the sonorous stone *ching*, emblematic by symphony of "good-

ness," "happiness;" (6) two oblong objects placed side by side, possibly books; (7) two rhinoceros' horns shaped into quadrangular form; (8) a leaf of the *Artemisia*, an emblem of good augury. Other forms found in these emblems are a branch of coral, a silver ingot, a cake of ink; and the shell, lotus-flower, and fishes belonging properly to the "eight lucky emblems."

56, 57. *Plates* (a pair) of thin pure white K'anghsi porcelain, having a flying *Fêng huang* and an Imperial five-clawed dragon (see No. 4) amid clouds contained by a floral scroll pattern within bands, all engraved in the paste. Round the rim is a border of bats set close to one another in vermilion red; and in center, within a medallion, are the characters *hung-fu-ch'i-t'ien*, "great happiness fills the heaven," in the old seal form engraved in the paste from beneath the foot, but reversed so that they read correctly on the upper side of the plate. Mark, *Ta-ch'ing-k'ang-hsi nien-chih*, "Made during the K'anghsi period of the great Pure Dynasty." Diameter, $7\frac{3}{8}$ inches.

58, 59. *Plates* (a pair) of white K'anghsi porcelain, for use on birthday occasions in the palace. The ornamentation consists in the center of the plate of a large *shou* (longevity) character in blue, containing a pointed peach of the genii in enamel glaze, upon which is represented a stork (*Grus viridirostris* Veillot) in blue (the peach and stork being emblems of immortality, see No. 27). Round this medallion is entwined conventional foliage in enamel colors, branching apart to afford eight spaces, in which are alternately a peach and the character *shou* in gold on blue medallion. Outside, on the rim, light-green bamboo stalks spring from rocks on which grow the red fungus of the immortals (*ling chih*). Mark as in last. Diameter, $8\frac{1}{4}$ inches.

60. *Vase*, circular in shape, of white K'anghsi porcelain, belonging to the *famille verte*. On it is represented a garden with a pavilion in the rear. In it the Seven Worthies of the Bamboo Grove (see No. 53) are depicted engaged in chess-playing, music, and writing upon the rocks, the main picture being confined by bands of arabesque ornament interrupted by panels, containing scholars' requisites, books, scrolls, etc., and above around the neck, a rod-fishing scene. Mark as above. Height, $18\frac{1}{4}$ inches.

61-63. *Panels* (8) of white K'anghsi porcelain, bearing representations of famous scenes from the celebrated historical novel, "*San kuo-chih*, or Records of the Three Kingdoms." This work, the most popular of its kind in China, details the triangular contest engaged in for the throne between Liu' Pei, assisted by Chu-Ko liang, Chang Fei, and Kuan Yü and Ts'ao Ts'ao, after his defection from Liu' Pei, and the Sun family, which resulted in the partition of the Empire among the houses of Han of Szechuen, of Wu and of Wei, founded, respectively, by Liu Hsüan-tê, Sun Chung-mon and Ts'ao Mêng-tê (A. D. 220 to 280).

69-76. *Panels* (8) of white K'anghsi porcelain decorated with flowers and butterflies in enamel colors and gold, surrounded by a border of the same upon a pale-green ground picked out with black.

These panels were originally in the form of bricks of about an inch and a quarter thickness. It was customary in the seventeenth and eighteenth centuries for princes to have large couches, 6 to 8 feet in length and having two end pieces, of ebony beautifully carved. The one I have seen had five of these square porcelain panels or bricks let into the back with a circular panel above the central one of the five, and one in either end piece. They were so fixed by means of square projections from the wood-setting which fitted into corres-

ponding holes left for the purpose in the bricks that one surface showed on either side of the setting with a rich and pretty effect, one surface displaying some historical scene, the other a group of flowers. Good specimens are now comparatively rare, and are now much sought after by foreigners to saw in half for the manufacture of *cache-pots*.

- 77, 78. *Panels* (2) of white K'anghsi porcelain, of similar origin to the above, but of inferior style of painting.
79. *Brick* (small) of white K'anghsi porcelain, showing the appearance of Nos. 61 to 78 in their original condition, before the surface-plates had been sawn away from the central portion into which fitted the wooden projections serving to keep the porcelain ornamentation in its position in the couch.
80. *Vase* of white K'anghsi porcelain; shape, slender *potiche*. The ornamentation in chief seems to depict a young officer leaving his post after a virtuous tenure of office, which has won for him not only promotion from the Emperor but also the love of the people he has ruled over. A young man dressed in pink is represented riding a piebald horse. (In the time of K'anghsi the Manchu officers despised and ridiculed Chinese luxury and ceremony, and with them the Sedan-chairs they have in later days adopted, with almost all else that is Chinese, from the conquered nation; and rode on horseback with but few attendants.) Over him an attendant is holding an official umbrella, which from its three flowers of different colors would appear to be a *wau-ming-san*, or "umbrella of ten thousand names," an offering made to a virtuous and upright officer on his departure from his post by a grateful people, and so called from the fact that it bears upon it the names of the donors either embroidered or in black velvet *appliqué*. He is preceded by men bearing lanterns and followed by an attendant carrying a scroll wrapped in Imperial yellow silk, indicative of a communication from the throne. Round the part where the vase diminishes in size runs a band of floral pattern on a pink ground interrupted by panels containing grotesque representations of dragons, the whole bounded on either side by bands of a geometric pattern in blue—all painted seemingly above the glaze. No mark. Height, 10½ inches.
81. *Vase* of pure white K'anghsi porcelain, tall, the body swelling out from the foot and then gradually tapering upwards. On one side is a character *shou* (longevity), on the other the character *fu* (happiness) in a diaper pattern in black upon a dark-enamel green. In the center of either of these characters is a medallion about 4 inches in diameter, containing mythological representations appropriate to the character in which it is placed. On the former is the Genius of Longevity (as Lao Tze, see No. 54) riding a white stork into the midst of the Immortals. On the latter Tung Wang Kung, the consort of the Queen of the Fairies (see No. 28), is handing a baby the elixir of life, while another of the sages stands by holding the *ju-i*. Where the body of the vase springs from the foot is a band of formal geometric pattern and around rim is a border of flowers on dark grey ground interrupted by white panels inclosing flowers, the whole supported by a narrow band of geometrical design. A beautiful specimen of K'anghsi ware. Height, 16¼ inches.

The *ju-i* is a curved baton, generally carved in jade or some other valuable material. It is probably of Buddhistic origin as it is one of the seven precious things (Sansk. *Sapta Ratna*) and appears in Buddhist pictures in the hands of priests of high rank. It is also regarded as a symbol of the power of the faith. In China it is commonly considered an emblem of good luck, its name signifying "(May all be) as you wish," and is therefore frequently used as a present to friends or at a wedding. It is also a sign of authority, owing to the fact that it is believed to have been used in India as a scepter.

82. *Vase* of pure white K'anghsi porcelain, tall, circular in shape, the outline rising almost perpendicularly but with a slight slope outwards, then contracting gracefully to neck, which everts at brim. A child holding in his hand a pink lotus flower (*Nelumbium speciosum*) is being presented to a tall Rishi (? Lao Tze) standing, dressed in embroidered robes of pink, with Tung Wang Kung (see No. 28) dressed in robes of yellow and blue and holding in his hand the peach of the Genii. On neck are sprays of bamboo and the fungus (*ling chih*) of the Immortals. A very beautiful specimen of K'anghsi ware. The figures are quite large, Lao Tze being 8 inches in height, and painted with considerable force and attention to detail. Height, $17\frac{1}{2}$ inches.
83. *Vase* of white porcelain, small, with swelling body suddenly contracting to form long, tapering neck, covered with the deep red glaze, known as *lang yao* or *sang-de-bœuf*, which has retreated from brim, though vase is colored inside. No mark. Height, $4\frac{1}{2}$ inches.
84. *Vase* of white porcelain, pen-shaped with short, narrow, everted neck. Covered with a deep green glaze, termed by the Chinese *lu-lang-yao* or green *lang* ware, the *lang* in the case of this specimen and of the last perpetuating, according to the statement of Chinese dealers, the first syllable of the surname of a Jesuit missionary who is credited with the invention of the composition used in these glazes. (See Glazes *ante*). The glaze is coarsely crackled inside and out. This is the only specimen of *green lang-yao* I have ever seen or heard of. No mark. Height, $7\frac{3}{8}$ inches.
- 85, 86. *Plates* (a pair) of pure white Yungchêng (1723 to 1735) porcelain. Ornamentation consists of two branches of the peach tree, one bearing pink, the other white blossoms. The branches spring from the foot, and, after spreading over the outside, cross the brim to cover the inside. Five peaches, varying from deep red at the pointed end to green near stem, are delineated on the inside and three on the outside. Above the flowers hover three bats on inside of plate and two on outside, thus forming a Chinese expression, *pi-t'ao-wu-fu*, the eight peaches and the five forms of happiness (see No. 27), equivalent to "long life and every kind of happiness." The painting is admirable. Mark *Ta-ch'ing-yung-chêng-nien-chih*, "Made during the period Yung Chêng of the Great Pure dynasty." Diameter, $8\frac{1}{2}$ inches.
87. *Rice bowl* of thin white Yungchêng porcelain with everted brim. Two sprays of rose spread so as to decorate the entire outside with bloom and leaves, the end of the spray with leaves, and bud passing over the brim to inside. This and the next three numbers are beautiful specimens. Mark, as in last. Height, $2\frac{1}{8}$ inches; diameter, $4\frac{3}{8}$ inches.
88. *Rice bowl* of thin white Yungchêng porcelain. Two sprays of peach-blossom, one bearing pink, the other white bloom, start from foot, spreading so as to decorate the entire outside and the ends of the sprays passing over the brim to the interior. Mark, as above. Height, $2\frac{1}{8}$ inches; diameter, $4\frac{3}{8}$ inches.
89. *Wine-cup* of pure white Yungchêng porcelain, having a crooked branch of the dwarf plum bearing white bloom most delicately painted around the side. Mark, as above. Height, $2\frac{1}{8}$ inches; diameter, $3\frac{3}{8}$ inches.
90. *Wine-cup* of fine white Yungchêng porcelain, with everted brim; decoration: Four medallions of about 1 inch diameter, containing each a group of heavenly bamboos with red berries (*Pien-chu*, *Nandina domestica*), convolvulus, etc., very delicately painted in natural colors. Mark, as above. Height, $2\frac{1}{8}$ inches; diameter, $3\frac{3}{8}$ inches.
- 91, 92. *Saucers* (a pair) of white Yungchêng porcelain. Decoration: *Inside*, in center within a double circle, two Imperial five-clawed dragons (see No. 4) with clouds and flaming sun engraved in paste, the clouds and one dragon being

- colored green, the other dragon auhergine purple on yellow ground; *outside*, round the rim, four flying *fêng huang* (see No. 4), between each two are cumuli clouds, all engraved in paste and colored green upon a yellow ground. On foot also yellow. Mark, as above, in auhergine purple. Diameter, $5\frac{5}{8}$ inches.
93. *Saucer* of pure white Yungchêng porcelain. Plain inside; on outside the bulging rim is decorated with red lotus flowers (*Nelumbium speciosum*), blue corn-flowers and conventional foliage on black ground. Mark, as above, in blue. A small but admirable specimen of the black ground porcelain produced by Fangying. (Cf. Preface.) Diameter, $4\frac{1}{2}$ inches.
- 94, 95. *Wine-cups* (a pair) of pure white Yungchêng porcelain, decorated with four medallions of formal floral scroll-pattern. Mark, as in last. Height, $1\frac{5}{8}$ inches; diameter, $2\frac{5}{8}$ inches.
96. *Rice-bowl* (small) of pure white Yungchêng porcelain with straight rim, ornamented with five similar medallions of sprays of peach bearing some white, some pink bloom, and two peaches and two bats in each, symbolical of a long and happy life (see No. 27). Mark as above. This and next three numbers are beautiful specimens. Height, $2\frac{1}{2}$ inches; diameter, $3\frac{5}{8}$ inches.
- 97, 98. *Rice-bowls* (a pair, small) of pure white Yungchêng porcelain, decorated with three groups of fruit-bearing branches, one of peach, one of pomegranate, and one of *tung yen* (the "dragon-eye" fruit, *Nephelium longum*). Mark as above. Height, $2\frac{1}{2}$ inches; diameter, $3\frac{5}{8}$ inches.
99. *Rice-bowl* (small), fellow to No. 88.
100. *Plate* (?) of pure white Yungchêng porcelain covered with ornamentation no less remarkable for its wealth of detail than for the delicate harmony of its coloring. In the center is a circular elevation of about $1\frac{1}{2}$ inches diameter, which has been cut off and hollowed out; on the depression thus made, which is, however, still somewhat higher than the body of the plate, is painted the character *shou* (longevity) in blue on a yellow ground which color forms the ground of the entire plate, but is scarcely visible so thickly is it covered with white, blue, and purple lotus-flowers and formal foliage in subdued tints. Among these flowers and equidistant from each other are four *shou* characters in blue forming tiny medallions, surrounded by a corolla (which give them the appearance of *hsi-fang-lien* or Indian lotus flowers) in light pink and lake. Four similar ornamentations enliven the rim. Of the underpart the rim is plain yellow, and the bottom of the plate a very delicate blue-green, except in center, where, in space corresponding to the elevation on the upper side already mentioned, the four characters *Yung-chêng-nien Chih* "Made in Yung-chêng period," in the ancient seal style, appear in blue on white ground. Diameter, $5\frac{5}{8}$ inches.
- 101, 102. *Dishes* (a pair) of white Yungchêng porcelain, circular in shape. The decoration *inside* consists of a pair of *yüan-yang* swimming amid pink lotus flowers and leaves in enamel colors, within a double ring; similar double ring at brim. On outside is similar decoration with border round the brim of small imperial five-clawed dragons amid clouds with sun. Decoration shows it to have been intended for wedding service in palace. Mark as on No. 85. Diameter, 7 inches.

The *yüan-yang* are the male and female respectively of *Anas galericulata*, commonly called by Europeans "Mandarin duck." These beautiful water-fowl manifest when mated a singular degree of attachment for each other, and they have hence been elevated into the emblems of connubial affection and fidelity.

- 103, 104. *Bowls* (a pair) of white Yungchêng porcelain with everted brim. Decoration *inside* consists of, at bottom, a "sitting" imperial five-clawed dragon in vermilion within a double ring, with similar ring at brim. On *outside* are two flying multi-colored *fêng huang* (See No. 4) separated on either side by an imperial five-clawed dragon, one green, the other red, among flowers and deli-

cate foliations in enamel colors; around the brim is a narrow border of the Eight Buddhistic Emblems (see No. 54) joined by conventional foliate ornaments. Mark as on No. 85. Height, $2\frac{3}{8}$ inches; diameter, 6 inches.

105. *Plate* (large, open) of pure white Yungchêng porcelain beautifully decorated with a bunch of large sprays of rose, pink peach, white peach, bamboos, and longevity fungus (*ling-chih*), which, after spreading around the outside, pass over the brim and cover the interior. Mark as on No. 85. A fine specimen, beautifully painted. Diameter, $19\frac{3}{4}$ inches.
106. *Vase* of pure white Yungchêng porcelain of gourd shape, contracted in the middle (*hu-lu*), decorated with a spray of vine, leaves green, grapes purple and shades of light brown, tendrils blue; on the ground is a gray squirrel eating some of the grapes it has plucked from the vine. Mark as on No. 85. Interesting to compare this with No. 37, a corresponding specimen of K'anghsi ware. Height, $4\frac{1}{2}$ inches.
- 107, 108. *Plates* (a pair) of white Yungchêng porcelain. Decoration inside consists of spreading gourd vines with green leaves, white open flowers, pink buds, and four gourds, contracted at middle, in shaded yellow, all in enamel colors; between the gourds and in center are five bats (the five kinds of happiness), all within a double ring, with similar ring at brim. On outside similar decorations run round the bellying rim. Mark as on No. 85. Diameter, $10\frac{3}{4}$ inches.
109. *Plate* of white Yungchêng porcelain. Decoration inside, five formal flowers of vermilion, with blue corolla and yellow centers, inclosed in a conventional ornamentation of green leaves and blue tendrils within a double ring, with similar ring at brim. On outside a similar decoration, containing eight of the same flowers, covers the rim. Mark as on No. 85. Diameter, $10\frac{3}{4}$ inches.
110. *Vase* of pure white Yungchêng porcelain, bellying gently outwards for two-thirds of height, when it contracts suddenly to form slender neck. Decoration consists of a branch of white peach and young bamboos, which spread from foot upward and outward, beautifully painted. A fine specimen, but unfortunately cut at neck. Mark as on No. 85. Height, $7\frac{3}{8}$ inches.
111. *Pencil-washer* of white Yungchêng porcelain, bell-shaped. On it is depicted the mountainous shore of a lake with jutting promontories, on which are cottages, with men fishing, all in claret red under a faintly gray transparent glaze. Mark as on No. 85. Height, $2\frac{3}{8}$ inches.
112. *Tea-cup*, with cover, of thin white Yungchêng porcelain, shaped like an inverted bell. On it is depicted a landscape of rolling hillocks separated by streams spanned by rustic bridges, delicately painted, with fine strokes, in brown, rocks shaded with reddish brown, grass land between hillocks of delicate pale green. Cover similarly decorated. Mark, a dragon in deep blue enamel above glaze. Height, $2\frac{1}{2}$ to $2\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches.
113. *Vase* of pure white Yungchêng porcelain, of globular shape. Covered with pale blue monochrome bearing four uncolored medallions within gilt bands, on each of which is painted a landscape scene representing one of the four seasons, drawn by a master hand. The winter scene is specially worthy of notice, the snow covering of the mountains, roads, and roofs being admirably brought out by throwing a slight haze over the background. Into a large circular hole in the top of the globe is inserted a flower-holder of cloisonné (dating from Chienlung's reign, *i. e.*, subsequent to 1735), with seven openings for single flowers. No mark. Height, $8\frac{3}{8}$ inches.
- 114, 115. *Plates* (a pair) of pure white Yungchêng porcelain. Decoration consists of sprays of chrysanthemums of various colors—on one they are white, pink, red, and yellow; on the other blue, pink, cream, and vermilion—beautifully shaded with leaves of several tones of green in enamel colors above glaze. Where the plate rises from the body to the rim it is fluted. Mark as No. 85. Diameter, $6\frac{3}{4}$ inches.

116. *Pencil-washer*, of pure white Yungchêng porcelain, in shape resembling a low circular dish of which the brim curves inward. The decoration consists of two *mang* (see No. 9) which, grasping longevity fungus and holding a branch of same in the mouth, with forked tails terminating in elaborate scroll form, run around the center; confined above and below by a band of formal scroll pattern—delicately painted and shaded in a vitreous lake or carmine color (Chinese *yen-chih*, rouge) above glaze. No mark, but unmistakably made under the direction of T'ang ying (see page 424). Height, $1\frac{5}{8}$ inches; diameter, 5 inches.
117. *Plate* of delicate white Yungchêng porcelain, with everted brim. Decorated inside with a group of three fresh lichees (*Nephelium lichi*), a peach, and a yellow lily most beautifully painted in enamel colors of natural shade above glaze. The outside is entirely colored with a deep rose, which imparts a blush to the white inside. This and the following number are admirable specimens of the celebrated "rose-back plates." No mark. Diameter, $7\frac{3}{4}$ inches.
118. *Plate*, exactly similar to last, but with different decoration. The group here consists of a deep red Chinese peony (*Pæonia Moutan*), a small peach, and a branch of *lung yen* (the "dragon-eye" fruit *Nephelium longum*). Diameter, $7\frac{3}{4}$ inches.
119. *Bombonnière*, of pure white Yungchêng porcelain, of flattened globular shape, box and cover of equal size. On latter a "sitting" imperial five-clawed dragon (see No. 4), in deep red, well painted and shaded, among deep blue flossy clouds. Round the box are two similar dragons flying in pursuit of sun. Admirable specimen of the ware; the outlines are crisp and clear, and the colors bright, contrasting pleasantly with the pure white of the ground. Mark *Fui-ss'u-t'ang-chih*, "Made at the order of the Fui-ss'u-t'ang Pavilion." Height, 4 inches; diameter, $6\frac{1}{2}$ inches.
- As each artist gives some more or less romantic designation to his studio, so the Emperor and Princes give some fanciful name to their palace, or a portion of it, which is not unfrequently found upon porcelain specially made for use in a special hall or pavilion, or for use by the owner of the "hall." In this case *Fui-ss'u-t'ang* was the designation given to a portion of his palace by the Imperial Prince Ho, living during Yungchêng's reign, who enjoyed one of the eight titles of hereditary principedom by blood royal conferred upon as many of the most noted Manchu captains at the time of the conquest of China. These hereditary princes are commonly termed "Iron-helmet princes," and the distinction is one very seldom conferred since. During the present reign an exception has been made, as a reward for his distinguished services, in favor of Prince Kung, who for a quarter of a century was head of the Board of Foreign Affairs.
- 120, 121. *Tea-cups* (a pair), with covers, of thin white Yungchêng porcelain, decorated with two imperial five-clawed dragons, pursuing sun amid clouds, all in deep red, the clouds, the dragons, and the scales of the latter being outlined in bright gold; covers bear similar decoration. Mark *Ching-ss'u-t'ang*, an imperial or princely hall mark, as yet unidentified. Height, $3\frac{1}{4}$ inches; diameter, $4\frac{1}{2}$ inches.
- 122, 123. *Plates* (a pair) of white Yungchêng porcelain. Ornamentation consists of six characters in "seal" style among chrysanthemum flowers, and leaves surrounding a seventh character inclosed within a wreath. On outside, round the brim, eight characters in "seal" style among chrysanthemums and flowers, all in deep blue under glaze. Mark as on No. 85. Diameter, $10\frac{3}{4}$ inches.

124. *Vase* (small) of white Yungchêng porcelain. From a low, broad foot the outline slopes without curve to about two-thirds of height and then contracts at an angle of slightly over 90 degrees to form narrow, straight, slender neck. The body is covered with conventional trailing flowers and leaves, confined above and below by a narrow band of geometrical pattern. At junction of neck with body is a smaller band of leaves and flowers, and above another row of flowers between two narrow bands of foliate scroll-work, another band of which runs round the foot, all in deep blue under glaze. Height, $7\frac{1}{2}$ inches.
125. *Vase* (small) of white porcelain, of delicate shape, somewhat resembling a pear, decorated with a group of peonies springing from a mass of rockery, boldly painted in deep blue under a glaze, which has a yellowish tint, owing to the closeness of the crackle (*truité*). A good specimen. No mark. Height, $6\frac{1}{2}$ inches.
126. *Wine-pot* of white Yungchêng porcelain, cubic in shape, with tall, slender, rectangular handle; decorated with chrysanthemums and ornate foliage, with a deep band of formal scroll-work at base, and foliate scrolls round the neck. A small flower pattern runs along the outside of the spout and of handle, all in good blue under glaze. Along the sides of the handle runs a Grecian pattern, and along those of the spout a floral scroll, molded in relief under glaze. No mark. Height of body, $6\frac{1}{4}$ inches to top of handle.
127. *Wine-cup* of fine, transparent, white Yungchêng porcelain, bearing five medallions, each formed by a *fêng-hwang* (see No. 4), with long curved wings, carefully painted in deep blue under glaze. Mark as on No. 85. Height, $2\frac{1}{2}$ inches; diameter, $3\frac{1}{2}$ inches.
128. *Vase* of pure white Yungchêng porcelain, circular in shape, bellying outwards to two-thirds of height, then contracting slightly to form low, open neck at point of contraction. Two handles, one on either side, formed of grotesque elephants' heads holding a ring in trunk in relief under glaze. Decoration consists of a child leading one water buffalo, with two others following more or less willingly, among spreading weeping willows, beautifully painted in deep, bright blue under glaze. An admirable specimen. No mark. Height, $8\frac{1}{2}$ inches; diameter, 7 inches.
129. *Vase* of pure white Yungchêng porcelain. In shape a half globe with tall, slender, everted neck rising from the center. Decoration consists of one of the Taoist genii (? *dao Tsze*) in long, flowing yellow robe with white hair and long, crooked stick, accompanied by an attendant standing under a spreading pine close beside dark-green-blue rocks. The pine trunk is delicately shaded in brown, the leaves of deep green, and the figures painted with the delicacy of miniatures. Attached is a metrical inscription to the following effect:

"Above a sheer abyss crag o'erhangs crag,
Whose heads aloft in purple distance soar,
Whose look to mind recalls the five Star-gods
Who help'd great Shun to rule in days of yore;
And shady glens betwixt form cool retreats
Where sages meet to con their mystic lore."

It is recorded that the "Five Old Men," the spirits of the Five Planets, appeared at Court B. C. 2246, and assisted the Emperor Shun with their counsels till he abdicated in favor of Yü, when they disappeared. Shun then dedicated a temple to the five planets and offered sacrifices in their honor, whereupon "five long stars" appeared in the heavens with other auspicious signs.

This and the following number are beautiful specimens. The paintings upon them are from the brush of Wang Shih-mei, styled Yen-k'ê, a celebrated artist of the present dynasty.

Height, 7 inches; diameter, $4\frac{1}{2}$ inches.

130. *Vase* of pure white Yungchéng porcelain, a pendant to the above, and bearing a decoration only differing in details. The inscription here reads:
- "The sage is gone on pleasure bent,"
Answer'd the boy 'neath pinewoods' shade;
"Where? I know not—but in these hills
Where clouds hang thick o'er some deep glade."
- Height, 7 inches; diameter, $4\frac{1}{2}$ inches.
131. *Wine-cup* (small) of pure white Yungchéng porcelain, decorated with three groups, each containing three sprays of bamboo delicately painted in green enamel color above rich glaze. Mark as on No. 85. Height, $1\frac{1}{2}$ inches; diameter, $3\frac{3}{4}$ inches.
132. *Wine-cup* (small) of pure white Yungchéng porcelain, decorated with sprays of pine, bamboo, and plum-blossom, symbolical of a long life (see No. 181) delicately painted in deep blue under a brilliant transparent glaze. Mark as on No. 85. Height, 2 inches; diameter, $3\frac{5}{8}$ inches.
133. *Vase* of pure white Yungchéng porcelain, shaped like a gourd contracted in the middle. Entirely covered with clouds, through which appears an imperial five-clawed dragon, all in deep transparent blue, contrasting well with the pure white ground. No mark. Height, 9 inches.
134. *Pencil-holder*, circular in shape and very broad, of white Ch'énghua porcelain (1465 to 1487). Decoration, in beautiful shade of blue under transparent glaze, a long poem from the pen of the celebrated poet di T'ai-po, of the Sung dynasty (A. D. 699 to 762), inculcating the Epicurean philosophy, which may be summed up in Horace's words, *Caïpe diem, quam minimum credula portuo*. The advice contained in the poem is being put into practice by a merry party round the festive board, whose actions express the words of the Latin author: *Fruamur bonis quæ sunt; pretioso vino et unguentis nos impleamus, non, prætereat nos flos temporis*. No mark. Height, 6 inches; diameter, $6\frac{7}{8}$ inches.
135. *Rice-bowl* of pure white Yungchéng porcelain ornamented with trailing gourd and leaves molded in relief under a thick céladon glaze. Mark as on No. 85. Height, $2\frac{1}{2}$ inches; diameter, $4\frac{3}{4}$ inches.
136. *Vase* of pure white Yungchéng porcelain with no ornamentation. Hexagonal in shape, bellying outwards for one-third of height, then rapidly contracting to form long tapering neck, on which, on either side, is an open ear-shaped handle covered with a uniform céladon glaze. Mark as on No. 85. Height, $10\frac{3}{8}$ inches.
137. *Vase* (small) of white Yungchéng porcelain, circular in shape, with narrow neck and ornamented with groups of lotus flowers molded on the paste in relief and covered with thick, pale céladon glaze. No mark. Height, $5\frac{1}{4}$ inches.
- 138-145. *Rice-bowls* (8) of thin, transparent white Yungchéng porcelain. Decoration on outside, formal Chinese pinks, with trailing leaves molded in relief, the bowl springing from a lotus flower molded in relief above foot; inside, at foot, a lotus flower engraved in the paste. Covered inside and out with a thick, transparent, céladon glaze. Mark as on No. 85. Height, $1\frac{3}{8}$ inches; diameter, $4\frac{1}{2}$ inches.
146. *Vase* of white Yungchéng porcelain, gradually bulging from base till suddenly caught in to form short, narrow, everted neck, and covered with monochrome glaze of dull carmine. Mark as on No. 85. Height, $8\frac{3}{4}$ inches.
147. *Incense-burner* of white Yungchéng porcelain, in shape of low, broad pan, with a small ring handle on either side, covered inside and out with a dappled-black and dark-green glaze—*Soufflé*—to imitate old discolored bronze. Highly valued by Chinese collectors. Height, $2\frac{5}{8}$ inches; diameter, $5\frac{1}{4}$ inches.
148. 149. *Plates* (a pair) of very thin, pure white Yungchéng porcelain; small and covered with a delicate Imperial yellow brilliant glaze. On foot, which is alone left white, mark as on No. 85, in blue. Diameter, $3\frac{3}{4}$ inches.

150. *Vase* (small) of white Yungchêng porcelain, of bulbous shape, with long narrow neck, covered with monochrome deep lake or carmine thick vitreous glaze, covered with fittings, in the terminology of French writers, *ayant l'apparence chagrinée d'une peau d'orange*. Height, 7 $\frac{3}{4}$ inches.
- 151, 152. *Rice-bowls* of white Yungchêng porcelain, everted. Plain inside. On outside are imperial five-clawed dragons flying amidst formal foliated scrolls, engraved in paste, the entire outside being covered with a monochrome brilliant glaze of deep green. Mark as on No. 85. Height, 2 $\frac{3}{4}$ inches; diameter, 5 $\frac{1}{2}$ inches.
- 153, 154. *Fish-bowls* (a pair) of Yungchêng earthenware covered with a curious glaze, termed by the Chinese *t'ieh-hsiu*, "iron rust," and having the appearance of holding minute iron filings in suspension. Mark as on No. 85, engraved on the foot. Height, 2 $\frac{1}{4}$ inches; diameter, 3 inches.
155. *Vase* of pure white Yungchêng porcelain, of slender shape, curving gently outwards to two-thirds of height, when it contracts to form slender neck, terminating in a flat open mouth. Covered externally with a bright, transparent crimson glaze, which has thickened at base of neck and assumed a darker shade. Colored glaze has been very carefully applied, so that interior and brim of mouth remain pure white. No mark. A specimen of *Nien-yao*, i. e. of the porcelain made under the direction of Nien Hsi-yao. (See page 419.) Height, 9 inches.
- 156, 157. *Screens* (a pair) of pure white Yungchêng porcelain, oblong in shape, and decorated with landscapes in Sepia: (1) a village under shelter of rocks on lofty bank of a river, on opposite bank a valley and water-fall overshadowed by trees; (2) a handsome pavilion on rocky eminence and approached by long, winding river-side road, overlooks the river, on which boats are seen sailing. Fair specimens of the "ideal landscapes" of Chinese artists. No mark. Height, 14 inches; length, 14 $\frac{1}{4}$ inches.
158. *Rice-bowl* of white Yungchêng porcelain, decorated with lilies, irises, and Chinese pinks of various hues painted in enamel colors of natural tones above glaze upon a deep violet ground. Mark *Yung-chêng nien-chih*, "Made during the Yungchêng period." Height, 2 $\frac{5}{8}$ inches; diameter, 5 $\frac{1}{2}$ inches.
- 159, 160. *Rice-bowls*, small (a pair), of pure white Yungchêng porcelain. On a purple-violet ground are sprays of a small blue flower with conventional foliage, which form four panels colored lemon yellow, on which are purple peonies, with green leaves painted in enamel colors of natural tones above glaze. Mark as on last. Height, 3 $\frac{3}{8}$ inches; diameter, 4 $\frac{3}{8}$ inches.
161. *Snuff-bottle* of pure white Yungchêng porcelain, of flat circular shape, decorated on either side with a group of cream-yellow chrysanthemums and vermilion-colored *cæleus*, painted with great delicacy. Mark *Lo-Ku-t'ang*, "the Hall of Delight in Antiquity," a princely designation as yet unidentified.
162. *Hanging-vase* of skimmed-milk-color white Yungchêng porcelain, of amphora shape, but without arms. A *mang* (see No. 9) boldly molded in relief, with head aloft and light coral red in color, curls round the neck. The vase is covered with a thick, brilliant transparent glaze, except at base, where a deep band, and at brim, where a narrower band, runs of geometrical scroll-work in dull white above glaze. No mark. Height, 4 $\frac{3}{8}$ inches; diameter, 2 $\frac{3}{4}$ inches.
163. *Vase* of pure white Yungchêng porcelain. In shape a half-globe with tall, slender, everted neck rising from center. A *mang* (see No. 9) in high relief, beautifully molded, with tail having scroll like terminations curls downwards round the neck, grasping a large branch of longevity fungus; the *mang* and fungus are of deep vermilion; the leaves of latter green, covered with thick, brilliant transparent glaze. No mark. A lovely specimen of T'angying's ware. (See page 423.) Height, 7 inches; diameter, 4 $\frac{1}{8}$ inches.

- 164-167. *Rice-bowls* (4) of white Yungchéng porcelain covered with closely-crackled (*truité*) glaze, having a purple tint rubbed into the crackling. Decoration, inside, at bottom, a peach with six leaves, forming a medallion; outside, four of the Buddhistic emblems (see No. 54), each supported on either side by a spray of flowers, to which it is attached by long flowing ribbons. Mark as on No. 85, in black on crackled foot. Height, 2 inches; diameter, $5\frac{1}{4}$ inches.
168. *Pencil-washer* of earthenware in shape of a longevity peach sliced in half. It is covered inside with thick white-blue glaze studded with deep pittings, as of burst bubbles, a rose and buds at bottom; outside is colored with the natural shades of an unripe peach. The handle is formed of the woody stalk, which throws out smaller shoots running over the sides of fruit, upon which are full-blown flowers, unopened buds, leaves, and green fruit molded in high relief and painted in natural colors. A curious specimen of a ware much esteemed by the Chinese. No mark. Height, $1\frac{1}{2}$ inches.
169. *Cup* of pure white Yungchéng porcelain of circular shape, everted. Decoration consists of, *inside*, waves at bottom, at sides bats, and at brim a border of Grecian pattern, all engraved in paste under transparent glaze; *outside*, between bands of a very delicate diaper pattern of red at brim, and of green with light-red center at foot, is depicted a high officer (possibly the Emperor himself) with two attendants descending the steps of a pavilion built under the shade of wide-spreading trees, and bearing in his arms the *ju-i*, or emblem of power, to meet a military officer, who, having just dismounted from his horse, around which stand subordinate officers and attendants, is advancing to meet the former. The inscription *Ch'u-chiang-ju-huang-chih-peï*, "Cup of him who departed as General and returned as Grand Secretary," shows the cup to have been ordered by the Emperor to confer upon some high officer who had been commander-in-chief in some war, and who had been invested with the high distinction of grand secretary upon his return crowned with victory. It should be added that in China military officers always occupy a relatively lower rank than do civil officers, and that the dignity of grand secretary, of which there are four, is the highest to which any subject, not of princely rank, can attain. Who the officer so honored in this instance was has not been as yet determined. Apart from the intrinsic interest attaching to such a specimen, the cup is remarkable for the miniature-like delicacy and wealth of detail which characterize the painting. Mark *Hsü-hua-t'ang-chih-taéng*, "Made for Hsü-hua Pavilion (the designation of part of the Imperial Palace, *i. e.*, for the Emperor) to confer upon" some high officer. Height, 2 inches; diameter, $4\frac{1}{4}$ inches.
170. *Vase* of white Yungchéng porcelain. Circular in shape, circumference rising straight to one-half the height of vase, when it suddenly contracts to form long, narrow neck. Decoration consists of formal flowers, peaches, and foliage in natural colors on light-blue ground, except where three gold circles form as many medallions on the white ground, on which are painted groups of chrysanthemums and red *cæus* in natural colors. No mark. Height, 8 inches; diameter, $4\frac{1}{4}$ inches.
171. *Pencil-washer* of white Ming porcelain: for details see above, p. 410
- 172-175. *Plates* (small) of white Ming porcelain: for details see above, p. 410.
176. *Pilgrim-bottle* of pure white Chienlung (1736 to 1796) porcelain of wheel shape on an ovate foot, with low circular neck attached by foliated handles. Decoration on front and back consists of a central boss bearing a formal foliate pattern, and surrounded by a band of Grecian pattern; round the boss as center are eight lambrequin panels, each containing one of the eight Buddhistic emblems (see No. 54), the panels being confined by another band of Grecian pattern. This ornamentation and a band of Grecian pattern round the brim of neck are molded in relief on the paste, and, together with the plain

edge of the foot, are covered with a rich celadon glaze. The neck, arms, remainder of foot, and flat surface of disk of wheel (or vase) are ornamented with lotus flowers and leaves in bright, deep-blue under glaze. Beneath foot, mark *Ta-ch'ing-chien-lung-nien-chih*, "Made in the Chienlung period of the Great Pure Dynasty." A very beautiful specimen. Height, $18\frac{2}{3}$ inches; diameter of disk, $9\frac{3}{4}$ and $14\frac{1}{4}$ inches.

177. *Vase*, small, of elongated drum shape, of pure white Chienlung porcelain, with ornamentation in deep blue beneath transparent glaze, consisting of formal interlacing scroll-work forming lotus-shaped panels containing the fungus of longevity (*ling-chih*), surmounted by *svastika*; around the rim another band of delicate foliated scroll-work. Mark as in last. Height, $3\frac{3}{4}$ inches.

The *svastika* is a mystic diagram of great antiquity. It is mentioned in the Rāmāyana and found in the well temples of India, as well as among all the Buddhistic people of Asia, and, as the emblem of Thor, among Teutonic races. In China it is the symbol of the Buddha's heart, *i. e.*, of the Esoteric doctrines of Buddhism, and is the special mark of all deities worshipped by the Lotus school.

178. *Vase* of pure white Chienlung porcelain, of flattened bulbous shape, with long tapering neck, covered with bats and clouds in blue, delicately shaded under glaze, confined above by narrow band and below by a double broader band, partly round the foot and partly on body where it commences to bulge, of conventional scroll-work. A handle on either side of neck, formed by a *man*g (see No. 9), finely molded in relief, clambering upwards from body of vase. Mark as in last. Height, $7\frac{1}{4}$ inches.

- 179-180. *Vases* (2) of pure white Chienlung porcelain. The shape resembles that of a pear, swelling gently as it rises until it suddenly contracts to terminate in a short, narrow, everted neck. At neck a light formal pattern, below which is a collar of scroll-work in panel form. Upon the body are sprays of peony (*Pæonia Moutan*), plum-blossom, and chrysanthemum above, and below branches, each bearing fine fruits, of pomegranate, peaches, and liches; confined at foot by a deep band of upright leaves—all in deep blue, shaded, under a thin transparent glaze. Mark as in last. Height, $12\frac{1}{2}$ inches.

- 181-182. *Rice-bowls* (2) of white Chienlung porcelain, ornamented with designs well painted in deep blue under a transparent glaze; *inside*, at bottom, a medallion of conventional ornate scroll-work; *outside*, three clusters, one of bamboo, one of plum-blossom, and one of pine. Mark as in last. Height, $2\frac{5}{8}$ inches; diameter, $5\frac{1}{4}$ inches.

P'englai-shan (Mount Horai of the Japanese) was one of the three Isles of the Genii, supposed to lie off the eastern coast of China, in which flowed the fountain of life in a perpetual stream, giving sempiternal vigor to the happy denizens of this paradise who drank its waters. The pine, the bamboo, the plum, the peach, and the fungus of longevity grew forever on its shores; the long-haired tortoise disported in its rocky inlets, and the white crane built her nest in the limbs of its everlasting pines. All these have thus come to be emblematical of long life. The first three, however, are almost always found in combination under the title of *sung-chu-mei* (pine, bamboo, and plum); the remainder either separately and alone or as adjuncts to the appropriate genii.

- 183, 184. *Vases* (2) of white Chienlung porcelain of *potiche* shape, but with everted neck, requiring no cover; bearing ornamentation of bats, emblematical of happiness, and lotus flowers with formal foliage interlacing of various shades of blue under transparent glaze; at neck a band of formal design and at foot a deeper band of same. On either side a sort of handle molded in relief, of a tiger's head holding a ring in the mouth. Mark same as last. Height, $8\frac{1}{4}$ inches.

185. *Vase*, small and slender, of pure white Chienlung porcelain, of double thickness at neck, the outer layer of paste terminating below in an everted scalloped-edge ruffle, curving outwards and downwards. Ornamentation consists of roses and chrysanthemums painted in deep blue under thick, transparent glaze, leaving three medallions of pure milk white, on which as open-work; chrysanthemums and bamboos, roses, and plum blossoms are respectively molded with great delicacy in relief under thick white glaze. Round the projecting edge at neck runs a foliated scroll engraved in relief under a white glaze. A very beautiful specimen. Being intended to hold flowers, the open-work of the medallions has required the presence of an interior vase, separate in the body but uniting at the neck, to hold water. No mark. Height, 5 inches.
- 186, 187. *Rice-bowls* (2) of white Chienlung porcelain. Ornamentation: *inside*, two circles inclosing a "sitting" imperial five-clawed dragon (see No. 4) amid clouds; *outside*, two flying dragons of the same character amid clouds; all in very deep, beautiful blue under a transparent glaze. Mark *Ta-ch'ing-chienlung-nien-chih*, in seal character in blue. Height, 2½ inches; diameter, 5½ inches.
188. *Pilgrim-bottle* of white Chienlung porcelain of same shape as No. 176, but of smaller size, and bearing precisely same decoration, which is, however, in deep blue, shaded, under a transparent glaze. Mark same as in last. Height, 13½ inches; diameter, 5½ and 10 inches.
- 189, 190. *Vases* (a pair) of white Chienlung porcelain bellying outwards above foot, then gradually contracting to form slender neck, terminating in a small globe. The ornamentation of the body consists of sprays of chrysanthemums, peach, plum blossom, pomegranate, peonies, and lichees, confined below by a band of formal panel scroll-work, surmounting a band of clouds, and above by two bands of Grecian pattern inclosing between them a band of formal panel scroll-work, surmounted by a second band of foliate scroll, the decoration being in deep blue under a transparent glaze. Mark same as on No. 187. Height, 11 inches.
- 191, 192. *Plates* (a pair) of white Chienlung porcelain. Unique specimens, displaying great artistic skill as well as wealth and beauty of ornament. At rim is a band having a foliate pattern incised in the paste, of conventional flowers and foliage in enamel colors on a magenta ground. Separated from this by a narrow bar of gold is a second band of open-work circular chain pattern of blue and gold links alternately on a ground of pale green, bearing a delicate ornamentation in black. Another thin bar of gold divides this band from the body of the plate, which is of lemon yellow, having a foliated pattern engraved in the paste. On the lemon-colored ground are seen the five poisonous reptiles, the flying centipede, the snake, the scorpion, the lizard, and the toad, with peony flowers and antidotes against the venom of these reptiles, namely, patch-work bags containing sprays of the *yü* plant (? dog-wood) and the *p'u* or typha rush, all in enamel colors of natural tint. On *outside*, on either side of perforated chain, which is painted as on inside, is a band of leaf pattern in shades of green on a deep orange ground picked out with a foliate pattern in gold. On foot is a simple ring studded with gems of green enamel in high relief on deep orange ground. Mark in vermilion same as on Nos. 186, 187. Diameter, 8½ inches.
- At the *Tuan yang* festival, on the 5th day of the 5th moon of each year, special offerings are made to these insects, and rough paintings of similar design to these plates are then hung over the door of each house.
193. *Vase* of white Chienlung porcelain, slender in shape, sloping gently outwards to about two-thirds of height, then gently contracting to form neck, which curves outwards at brim. Upon a ground of delicate pale green throughout

is painted the decoration which consists of conventional flowers and foliage of varied colors outlined in gold. This main decoration is confined at foot by a deep border of formal foliated scroll pattern in brick red on a yellow ground, and at base of neck, by a narrow border of same; from which springs a crown of banana leaves of light green veined with gold and outlined with blue; above this is a band of conventional flowers and foliage confined by a foliate scroll outlined with blue and gold on a yellow ground. Mark in gold same as on Nos. 186, 187. Height, $13\frac{1}{4}$ inches.

194. *Vase* of white Chienlung porcelain. Circular in shape curving gently outwards till at four-fifths of its height it contracts to form a short neck curving outwards at brim. On a ground of pea green covered with a foliated pattern engraved in the paste branches of magnolia zulan, red peach-blossom, peonies with full-blown flowers of red and of yellow, with vermilion buds, spring from a cluster of rocks on which stands the sacred *fénghuang* (see No. 4), all beautifully painted and shaded in natural colors under brilliant glaze, the greens being enamels. Inside of vessel gold. Mark as in Nos. 186, 187. Height, $19\frac{1}{4}$ inches.
195. *Vase*, tall, circular in shape. On a pea-green ground covered with a small foliate pattern incised in the paste is an old man holding a long crooked stick, and dressed in a long vermilion cloak, with a tall conical cap upon his head, to whom a boy dressed in pink is presenting on bended knee a bat, while four other bats hover in the air, well painted under a brilliant glaze. No mark. Height $14\frac{3}{8}$ inches.

A common motive with Chinese artists is the presentation to Lao Tze (see No. 54), the great philosopher and founder of the Taoist sect, of an immortality peach, by Tung Wang Kung, the consort of the legendary Queen of the Fairies, Hsi Wang Mu, or by one of his attendants, on the Sage's arrival at her mountain palace in the K'unlun range (see No. 28). The same subject is here depicted, a bat replacing the peach. Since the pronunciation of the character for "bat" is the same as of that for "happiness," the five bats symbolize the "five blessings or happinesses." Lao Tze is receiving the first, "longevity;" the remaining four, riches, peacefulness and serenity, love of virtue, and an end crowning the life, hover over his head.

- 196-201. *Wine-cups* (6) of white Chienlung porcelain, colored, *inside*, pale green; *outside*, of deep blue, *bleu de roi*, on which spread sprays of peony, *magnolia yulan*, and grasses delicately painted in gold, and confined at brim and where cup springs from the foot by a band of Grecian pattern, also in gold. Good specimens, well preserved. Mark as on Nos. 186, 187. Height, $1\frac{3}{8}$; diameter, $2\frac{1}{4}$ inches.
- 202, 203. *Vases* (a pair) of pure white Chienlung porcelain, of shape termed by Chinese *hai-t'ang*, *Cydonia Japonica* and *Pyrus spectabilis* or *baccifera*, slender, gently bulging to two-thirds height, then contracting slightly to neck, everted at mouth, entirely covered with deep blue glaze (*bleu de roi*); divided by flutings into four sections throughout, each section or scallop decorated with ornamental scroll-work and peach sprays with conventional medallions formed of longevity fungus, from which spring lotus-flowers, over each of which hovers a bat with extended wings (symbol of happiness). Around foot is a deep border formed by a band of flowers supporting a second band of conventional foliate scroll-work. Round the neck is a border partly of geometrical pattern, partly of foliate scroll-work; above, in middle panel, a medallion of peach branches with leaves and fruit flanked on sections of side panel, which are formed by a gilt handle similar to conventional scroll-work on body, by narrow spray of similar peach. Round the rim is a narrow band of bats with

outstretched wings. The ornamentation, which typifies "long life and happiness," is throughout of bright gold. Inside a pale green. On foot of same color. Mark as on No. 186. Unique and very beautiful specimens. Height, 18 inches; diameter, $6\frac{5}{8}$ and 8 inches.

204, 205. *Vases* (a pair) of pure white Cheinlung porcelain, circular in shape, bulging suddenly above foot to one-half height, then contracting to form long neck, everted at brim. Decoration consists of an Imperial five-clawed dragon pursuing sun and five bats among clouds over breaking waves at foot; beautifully molded in relief under white glaze. Round the foot a band of Grecian pattern incised in paste under glaze. Mark as on No. 186. Height, 12 inches; diameter, 8 inches.

206. *Vase* of white porcelain, globular in shape, with straight, somewhat broad neck. Decoration: from a mass of rocks colored blue, green, and white, and on which grow red and white peonies, springs a spreading tree, with green trunk and leaves, some white, some green. Among the branches stands a stork on one leg, another stork is shown flying from among clouds above, while four more stand below in various positions on and around the rocks, the storks being white, with black legs, tails, and beaks and red crests. The ground color of the vase is brown aubergine, covered throughout with a brilliant transparent glaze. The date is uncertain, but the style of decoration indicates that it may belong to a period considerably anterior to Cheinlung's reign; it certainly is not of a later date. Height, $15\frac{1}{4}$ inches.

Represents the home of the stork of immortality on P'êng-lai-shan (see No. 181).

207-210. *Tea-cups* (4) of thin white Cheinlung porcelain, with wide mouths. Decorated with slight sprays of conventional lotus flowers and leaves, forming four panels, in each of which is a small similar flower with a butterfly on outstretched wings above in deep tones and one in light tones below. Very beautifully painted. Mark as on No. 186. Height, $2\frac{5}{8}$ inches; diameter, $4\frac{1}{4}$ inches.

211, 212. *Cups* (a pair), small, of pure white Cheinlung porcelain, with wide mouths. Inside plain. On outside, on thick violet ground, are sprays of iris; Chinese pinks of various colors, red peonies, and yellow peonies spring from the foot of cup. Mark as on No. 186. Height, $1\frac{3}{4}$ inches; diameter, $3\frac{5}{8}$ inches.

213. *Hanging-vase*, flat, of pure white Cheinlung porcelain. On an imitation wooden stand, colored vermilion, with a scroll pattern (representing the carving usual on such stands) in gold, stands a vase of the shape of a gourd contracted at the middle (*hulu*) conventionalized by giving a scalloped outline to the two globular portions, into which the gourd is shaped by the central contracting band. On the lower and larger portion is a panel outlined in gold, and of lower level than the surrounding body. On the panel is a landscape painting of mounted Tartars in official dress, hunting; the body is decorated with delicate foliations in gold, studded with conventional star-shaped flowers of various, but subdued, colors. A narrow band of panel scrolls in brick-red, edged with white on a green ground, and a second band of delicate blue and pink flowers on a pale yellow ground, contract the gourd at the center. Above, on the smaller swelling, the ground of which corresponds with that of the larger swelling below, is a second gold-edged panel containing a four-line stanza signed by the Emperor Chienlung, himself an ardent sportsman, extolling the pleasures of the chase. The outward sloping neck is decorated with a band of scalloped upright banana leaves on the same ground as covers the lower portion of the vase. Mark as on No. 186. The landscape and figures admirably painted; style of decoration shows great artistic skill. Height, $8\frac{1}{2}$ inches.

214. *Wine-pot* and cover of pure white Chienlung porcelain. Of slender, graceful form, entirely covered with plain gold. No mark. Height $8\frac{3}{4}$ inches.

- 215, 216. *Bowls* (a pair) of white Chienlung porcelain. Everted brims. Covered inside with a straw-colored glaze. Outside the ground is of brick-red, showing in the natural white of the porcelain a decoration of conventional lotus flowers, chrysanthemums, and foliage, shaded with the color of the ground, vermilion. Mark as on No. 186. Height, $2\frac{5}{8}$ inches; diameter, $5\frac{1}{2}$ inches.
217. *Pencil-holder* (small) of enamel, on copper, cylindrical, with four gilt dragon handles. Divided into two sections by three narrow horizontal bands, one at top, one at foot, and the third midway between, of minute convolvulus, peony, iris, and chrysanthemum blooms on white ground. The two sections thus formed have a ground of diaper-pattern in deep olive green; on the upper section in each space between the bands is a panel containing a miniature landscape in crimson; on the lower are two long panels of landscapes with men fishing with rod and line, separated by two smaller panels each containing a European lady holding a flower, delicately painted. Specimen of the work of T'angying (see page 423). Mark as on No. 186. Height, $2\frac{1}{2}$ inches; diameter, $1\frac{1}{2}$ inches.
218. *Vase* of white Chienlung porcelain. Shaped as a slender gourd. Contracted at middle by a band of narrow pointed leaves above, and another below, a central ribbon, molded in relief; from upper and smaller swelling spring two ear-shaped handles, covered entirely with dull monochrome glaze of deep olive or "tea-dust" (*ch'a-mo*) color. Mark as on No. 186 impressed in foot. Height, 10 inches.
219. *Flower-holder* of white Chienlung porcelain. In shape a much flattened globe, from which springs a wide everted neck closed at top, with three perforations to hold single flowers covered with brilliant deep blue (*bleu de roi*) glaze. Mark as on last. Height, $3\frac{1}{2}$ inches.
220. *Vase* (small) of pure white Chienlung porcelain. From a small stand, vermilion color, bearing a geometrical scroll pattern in gold—to imitate a stand of carved wood—springs the vase, gently bulging to two-thirds height, when it contracts to form everted neck. The body is of dull light blue, on which are conventional flowers in various shades of pink and yellow with scroll foliage in shades of green veined with darker tints of same, confined at foot by a panel band of delicate pink edged with dull green; and, at contraction below neck, by a band of foliated scrolls of pink outlined with deep green, the pink becoming lighter till it merges in a narrow band of vermilion studded with small open circlets of gold. The decoration at base of neck consists of a bulging band of yellow, bearing conventional flowers of various shades of pink and yellow, and green scroll-like foliage. Above on the trumpet-shaped neck is the same dull, light-blue ground as on body, bearing pink and white flowers with delicate green leaves, confined below by a band of upright banana leaves of palest green outlined with white and veined with black, and above by a band round the brim of vermilion, bearing scroll-work in gold. Inside pale sea green. On foot of same, mark as on No. 186. A choice specimen. Height, $5\frac{7}{8}$ inches.
221. *Pencil-holder* of pure white porcelain, of broad circular shape. Consists of beautifully molded open work representing a bamboo grove strewn with rocks partially covered with stone crop, on one of which is a "painted" thrush about one-half natural size. The bamboo stalks are of pale green enamel, the fibers at joints shaded in brown, leaves of emerald merging into peacock green, rocks light green delicately shaded into blue at hollows and under parts, thrush very delicately painted in brown, shaded with darker tint of same, every feather being defined. An exceptionally fine specimen. Mark *lū-chu-shan-fang-chên-ts'ang*: "The precious treasure of the house of green bamboo hill." Height, 6 inches; diameter, $5\frac{3}{4}$ inches.
222. *Pencil-holder* of white Chienlung porcelain. Tall, cylindrical in shape. Formed of sections of slight bamboos kept in place by a ribbon at top and another at

base, passing through the center of the bamboos and tied in bows. Painted in gray, well shaded in black under rich glaze. No mark. Height, 4 $\frac{1}{2}$ inches; diameter, 2 $\frac{3}{4}$ inches.

223. *Hanging-vase* of pure white Chienlung porcelain. From well molded stand of dull vermilion with rectangular supports, representing a carved wood stand, springs the elliptical shaped vase with short bulging neck. The body of the vase consists of a deep magenta ground on which are conventional flowers of alternately blue, violet, and yellow, shaded with deeper tones of same colors; and scroll-like foliage of deep green at center passing into lightest green or white at the edges. In center is a scallop-edged panel bearing in large old-seal characters a poem composed by the Emperor and bearing his seal. Mark beneath foot as on No. 186. Height, 10 inches; diameter, 2 $\frac{1}{2}$ and 8 $\frac{3}{4}$ inches.
- 224, 225. *Jars* (a pair) with covers, of white Chienlung porcelain. Globular in shape. On a bright yellow ground are four groups of growing plants of white lotus tipped with pink, of white plum blossoms with pink centers; of white and pink peonies, and of white and pink lotus flowers and green leaves, the outlines and veining of which are engraved in the paste, confined above and below by bands of panel and foliate scroll patterns combining the same colors as those used upon the flowers—green, white; and pink. Over the mouth is a close-fitting cover ornamented with two butterflies and two sprays of plum blossom on the same deep yellow ground—all covered with a brilliant transparent glaze. No mark. Height, 10 $\frac{1}{2}$ inches.
226. *Vase* of white Chienlung porcelain, shaped as a gourd contracted at middle (*hulu*). Entirely covered with an elaborate design of trailing gourds (of same shape as vase) with conventional scroll-like leaves, and bats, outlined in gold and shaded partly in gold and partly in silver, upon a dull olive green or "tea dust" (*ch'a-mo*) ground. A very rare specimen. Mark as on No. 186. Height, 8 inches.
227. *Pencil-holder* of white Chienlung porcelain, of slender, cylindrical shape. The philosopher Lao Tsze on his way to the palace of the Fairy Queen, Hsi Wang Mu (see No. 28) is represented soaring upon a cloud arranging his shoe. In the distance is the Mountain Palace of the Fairies, with the Queen's azure-winged attendant birds (*ch'ing niao*), all beautifully molded in high relief under a brilliant, deep yellow glaze. No mark. Height, 5 inches; diameter, 1 $\frac{1}{2}$ inches.
- 228-233. *Wine-cups* (6) of white porcelain, plain inside. Nos. 228, 230, 231, 233 are studded with small conventional star-like flowers circular in shape, of various colors delicately shaded, on a celadon ground. Nos. 229 and 232 bear the same flowers, but outlined and shaded in gold on a dull black ground. No mark. Height, 1 $\frac{1}{2}$ inches; diameter, 2 $\frac{3}{8}$ inches.
234. *Plate* of white Chienlung porcelain, entirely covered with a brilliant pale celadon glaze, above which is depicted in bright gold a clump of bamboos springing from rocks with a short poem eulogistic of their beauty. Mark as on No. 186. Diameter, 1 $\frac{1}{2}$ inches.
235. *Vase* of pure white Chienlung porcelain, of flattened bulbous shape with straight, slender neck. Outlined by engraving in the paste are flaming sun, colored carmine, and conventional clouds colored white, blue, green, and carmine, and above foot waves of brilliant green, with foam and breaking edges of pure white. The ground outside of the incised decorations is deep Imperial yellow, on which are two Imperial five-clawed dragons (see No. 4), one descending from the clouds, the other rising from the waves, beautifully drawn and shaded in deep brown, the yellow ground appearing through the shading. At rim of neck is a foliated scroll border engraved in the paste and colored white with blue outline; inside colored yellow. No mark. Height, 11 $\frac{1}{2}$ inches.

236. *Vase* of pure white Chienlung porcelain of *lancelle* shape. In tumbling waves of brilliant blue (shaded) with light foam crests is a four-clawed dragon of resplendent white beautifully molded in high relief, covered with a very thick, transparent vitreous glaze. A beautiful and very effective ornament. No mark. Height, $14\frac{7}{8}$ inches; diameter, $7\frac{3}{8}$ inches.
237. *Snuff-bottle* of pure white Chienlung porcelain, with stopper to match. Circular in shape, very thin and flat. Upon a pale lemon-yellow ground are two round scalloped gourds upon trailing stems, bearing five-petal flowers, some white, some pink, and leaves of various shades of green delicately shaded, with a butterfly on either side below with outspread wings, and painted in delicate tones and with considerable skill. Mark *Chien-lung-nien-chih*: "Made in reign of Chienlung."
238. *Vase* of white Chienlung porcelain, pear-shaped with low, narrow everted neck. On a white ground are four Imperial five-clawed dragons (see No. 4), well drawn and shaded in carmine amid chrysanthemums and formal lotus (the so-called western lotus) with trailing scroll-like foliage, all in deep blue, confined at foot and at top by a deep band of foliated panel-pattern in blue, with small ornament in magenta in center. Above this band at top and extending to foot of neck is a band of longevity fungus in magenta with blue scroll leaves. Round the neck a circlet of banana leaves pointing upward. Mark as on No. 186. Height, 14 inches.
239. *Snuff-bottle* of pure white Chienlung porcelain, small, of circular shape, somewhat flattened, with a handle formed by a grotesque lion's head holding a ring in its mouth molded in relief on the convexity of either side, colored vermillion and picked out with gold. On the body are stalks of pink and white peonies, pink rose, white *magnolia yulan* and red plum blossom springing from rockery, very beautifully painted under a brilliant transparent glaze. Mark as on No. 186. Height, $1\frac{1}{8}$ inches.
- 240, 241. *Bowls* (a pair) of pure white Chienlung porcelain, with everted brim. Decorated inside at bottom with octagonal ornament and, alternately, formal flowers and butterflies rising from the eight sides of the ornament; above and round the sides, four gourd-shaped vases delicately ornamented with geometrical and scroll designs and bats and chrysanthemums, suspended over them being elaborate hexagonal canopies with long streamers dependent from the six angles. Outside are four medallions of pure white, inclosed by gold band and containing a group of table articles, of which the chief is a vase containing a branch of plum or other blossom, with a small delicately ornamented jar covered with canopy and streamers depending from the branch; the remaining articles being dishes of fruit, a water-holder, incense-burner, etc., delicately painted. Between the medallions a small conventional lotus flower below, and a larger flower of same above, with scroll-like foliage on a deep magenta ground, which is covered outside the flowers and leaves with delicate foliate ornamentation engraved in the paste. Earliest specimens of the so-called "medallion bowls" which a few years ago brought such high prices in England. Mark as on No. 186. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{1}{8}$ inches.
242. *Dish* of white porcelain, of low, slightly ovate shape, formed by a lotus leaf (*Nelumbium speciosum*) curling up at edges, veining incised on inside and in relief on outside; a flower and seed-pod ascend on outside from beneath leaf to rest on its edge, while a lizard crawls from inside having its body on the leaf-edge and head raised aloft. Covered throughout with fine "peacock" green glaze uncrackled. No mark. Diameter, $8\frac{1}{2}$ and $9\frac{1}{4}$ inches.
243. *Snuff-bottle* of pure white Chienlung porcelain, of flattened ovate shape terminating in long, slender neck. On one side is Yang Kuei-fei, and on the other Hsi Shih clad in rich embroidered robes playing on the guitar, painted with great delicacy above brilliant glaze. No mark.

Yang Kuei-fei, the daughter of an obscure official in the modern Szeehuen, was introduced by the designing minister Li Liu-fu into the seraglio of the Emperor Ming Huang, of the T'ang dynasty (died A. D. 762). Becoming enamored of her beauty, the Emperor abandoned the wise counsels of Chang Yüeh, Chang Chin-ling, and other ministers, under whose administration the empire enjoyed great prosperity, and sank, year by year, more deeply in the toils of amorous dalliance. The Princess Yang's three sisters were also introduced into the seraglio and endowed with valuable fiefs. No outlay was spared in gratifying the caprices and covetousness of his family of favorites, and the nation was sacrificed to the licentious enjoyment of the court, till at last the people rose in revolt, the aged monarch was forced to take refuge in western China and, after undergoing the misery of witnessing the butchery of his favorites, to abdicate in favor of his son.

Hsi Shih, the daughter of humble parents, but the *ne plus ultra* of loveliness in Chinese tradition. A report of her consummate beauty having reached the ears of her sovereign, Kon Chien, Prince of Yüeh, a state occupying the east coast of China below the Yangtze in the fifth century B. C., he had the girl trained in all the accomplishments of her sex and sent her as a present to his victorious rival, the Prince of Wu, in the hope that her charms might prove his ruin. The stratagem was successful and Fu Ch'a, Prince of Wu, abandoning himself to lustful dalliance, was ere long defeated and crushed. It is said of Hsi Shih that finding her beauty was enhanced by an air of melancholy, she was accustomed to knit her brows as though in pain, and this device, adding as it did to her attractiveness, was copied by rival beauties who vainly sought to equal her charms.*

244. *Vase*, white Chienlung porcelain, bulging from foot to two-thirds height, then contracting to short everted neck. Ornamented with long trailing stalks of conventional lotus flowers and leaves molded in relief on paste; confined below by foliate panel ornamentation, also in relief, with shading engraved in the paste, and above, by a band of same, having above it a band of geometrical pattern and round the neck a foliate band, both engraved in the paste and covered by a celadon glaze so faint as to be almost white. No mark. Height, 12 $\frac{3}{8}$ inches.
245. *Vase* of white Chienlung porcelain, pear-shaped like No. 238 but more slender; having nine Imperial five-clawed dragons (see No. 4) surrounded by flecks of flames, soaring in mid-air and rising from waves which are incised in the paste around foot, all finely molded in relief, with crisp outline on the paste and covered with a deep peacock-green glaze coarsely crackled. A beautiful specimen of this rare ware. No mark. [M. du Sartel gives a drawing in his work of a similar vase, which he (erroneously) refers to what he terms *la première époque*, i. e., the early portion of the Ming dynasty, fifteenth century]. Height, 14 inches.
246. *Pencil-holder* of pure white Chienlung porcelain, of cylindrical shape with much everted mouth and corresponding foot, and bound in middle by a raised band ornamented with flowers and leaves; from either side of this band springs a circlet of veined banana leaves, all incised in the paste under a brilliant transparent glaze. A Chingtê-chên copy of a similar article of the Tingchow ware of the Sung dynasty, an ancient bronze vessel having served as the original model. No mark. Height, 2 $\frac{5}{8}$ inches; diameter at mouth, 3 $\frac{3}{4}$ inches.

* Mayers: Op. cit. No. 571.

247. *Bowl* of white Chienlung porcelain with everted brim. Decorated, outside, with grasses, yellow lotus flowers, blue and red pinks, peonies, and leaves of various shades of green well painted, on somewhat dull vermilion ground; with flowers on white ground at bottom inside. Mark as on No. 186. Height, $2\frac{5}{8}$ inches; diameter, $5\frac{1}{4}$ inches.
- 248-251. *Rice-bowls* of white Chienlung porcelain, with everted brim. On outside, bands at rim and above foot, of foliated scroll-work in white shaded with vermilion on a ground of same color, confine a plain white space on which is written in vermilion characters a long poem composed by Emperor Chienlung and bearing his seal and date of "the spring of Ping-yen," i. e., 1746. On inside on plain white ground, at bottom branches of pine, plum blossom (emblems of longevity, see No. 181) and the "Buddha's hand" citron (*Citrus sarcodactylus*) in vermilion; on side two bands of scroll-work similar to those on outside. Mark as on No. 186. Height, $2\frac{1}{2}$ inches; diameter, $4\frac{1}{4}$ inches.
252. *Wine-cup* of thin, pure white Chienlung porcelain, with wide, open mouth. Inside plain, covered with brilliant transparent glaze. On outside, between two narrow bands of Grecian pattern at rim and above foot is a very close and delicate ornamentation of lotus flowers and leaves, engraved, as is the Grecian pattern, in the paste, which is unglazed. On this, as ground, appear two Imperial five-clawed dragons molded in relief and beautifully drawn and shaded in vermilion under brilliant glaze. Mark as on No. 186. A very curious and beautiful specimen. Height, 2 inches; diameter, $4\frac{1}{4}$ inches.
253. *Plate* of white Chienlung porcelain, decorated inside with red peony (*Pæonia Moutan*), white *Magnolia yulan*, and buds on a deep blue ground ornamented with a foliate decoration engraved in the paste. On outside under brim five bats, symbolical of the five kinds of happiness, in vermilion. Mark as on No. 186. Diameter, 8 inches.
- 254, 255. *Plates* of white Chienlung porcelain, similar to above. Decoration on inside consists, however, of sprays of red rose, asters, and pomegranate on a green ground similarly ornamented with foliate decoration engraved in paste. Mark and size the same as last.
256. *Plate* of white Chienlung porcelain. On light whitish carmine ground ornamented with conventional lotus flowers and leaves in deep carmine, on which are five foliated panels containing landscape scenes in enamel colors, in foreground of each of which is a European clad in the dress of the Louis the Fourteenth period, bearing a sword, a branch of coral, a *ju-i* (see No. 81), a crutch, and the model of a European house on a salver. Outside decoration and mark same as on No. 253.
257. *Plate* of white Chienlung porcelain. On a vermilion ground ornamented with conventional lotus flowers and leaves in gold are five foliated panels containing landscapes painted in enamel colors. Outside decoration and mark same as on No. 253.
258. *Plate* of white Chienlung porcelain. On pale yellow-brown mottled ground resembling agate are five foliated panels containing landscapes in enamel colors, in foreground of each of which is a child carrying a halberd, a lotus flower, a *ju-i*, a Buddhistic sacred relic (*shé-ti*) on a salver, and one pursuing a butterfly. Outside decoration and mark same as on No. 253.
259. *Plate* of white Chienlung porcelain. On a light green ground covered with delicate cloud-like ornaments in black are sprays of lotus, roses, *Pæonia Moutan*, plum blossoms, and chrysanthemum in natural colors. Outside decoration and mark as on No. 253.
260. *Bowl* (small) of white Chienlung porcelain. Plain inside. Outside, on a pale, rich, celadon ground are flowers painted in vermilion, with leaves of enamel green. Mark as on No. 186. Height, $1\frac{3}{4}$ inches; diameter, $3\frac{3}{4}$ inches.

261. *Vase* (small) of white Chienlung porcelain, of slender jar shape. Covered with a broad, double band of modified Grecian patterns in relief on basket-work ground engraved in the paste, confined above and below by bands of foliate design in relief with incised shading. Round the neck circle of banana leaves in relief with incised shading, all under transparent glaze having a celadon tinge. Mark as on No. 186. Height, 7 inches.
- 262, 263. *Plates* (a pair) of white Chienlung porcelain, circular with upright edges, small. In center is a gourd and two sprays of flowers tied with flowing ribbons held by a bat with outstretched wings amid clouds, very delicately molded in relief and covered throughout with a pale celadon glaze. Mark as on No. 186. Height, 1 inch.
264. *Vase* of pure white Chienlung porcelain, curving inwards slightly above foot, then bulging gradually to two-thirds height when it contracts gradually to near mouth, which is slightly everted. At foot, a narrow band of conventional lotus flowers and leaves. Above, confined by band of foliated design engraved in the paste are four conventional lotus flowers with scroll-like leaves and flying bats so arranged that five bats (*wu fu* or five kinds of happiness) appear round each flower. At base of neck is a narrow band studded with small dots (gems) in relief. Above, round the neck, a broad band of ornamentation similar to that on body, confined at top by band of foliated scroll-work. The ornamentation throughout is molded, boldly but with great delicacy, in relief upon the paste, and is covered with a brilliant deep celadon glaze approaching white in the highest portions of the relief. Mark as on No. 186, but in shape of a seal and in high relief. A unique and very beautiful specimen. Height, $11\frac{1}{4}$ inches.
265. *Vase* of pure white Chienlung porcelain, of flattened bulbous shape with long slender neck which represents half of total height. Upon the body of the vase is a *mang*, the tail of which curls upward round the neck (see No. 9), very boldly molded in relief with head erect and long beard depending from chin. Covered throughout with a brilliant celadon glaze, the *mang* being spotted with marks of red and brown mixed, shading off into the glaze, and on the body of the vase are curious cloud-like splotches of deepest olive green shading off at the edges. Mark as on No. 186. Height $12\frac{3}{8}$ inches.
266. *Vase* of white Chienlung porcelain of slender bulbous shape with neck ending in trumpet-shaped mouth, entirely covered outside with a uniform glaze in color between vermilion and deep carmine. Rim of mouth and inside plain. Mark as on No. 186. Height, $11\frac{3}{4}$ inches.
267. *Pencil-washer* of white (Chienlung) porcelain, in shape resembling an S scroll with tall perpendicular sides. Inside biscuit unglazed. Outside covered with a uniform deep green (called by Chinese "cucumber green") closely crackled (*truité*). No mark. Height, $1\frac{1}{4}$ inches; length, $3\frac{1}{2}$ inches.
- 268 and 269. *Vases* (a pair) of white Chienlung porcelain, a pomegranate fruit in shape—of the kind termed *flambé*. The mixed blue and white colors which cover the mouth and inside, flowing down and being specially prominent in the hollows at junction of the sections, the latter being a brilliant purple red, and the conflicting tints gradually merging into one another at the edges of contact, all covered with a brilliant thick vitreous glaze.
270. *Vase* of white Chienlung porcelain shaped as a gourd contracted in the middle. Covered with deep red having a somewhat mottled appearance on lower globular portion, under a brilliant, thick vitreous glaze, the edge of the mouth inside and out being white, though the color appears inside farther down. No mark. Height, $8\frac{5}{8}$ inches.
271. *Vase* of white Chienlung porcelain, of ancient bronze design, in form of two diamond-shaped vases of which one-fourth of the length has been cut off and the sections united, at either end an elephant's head with trunk forms a

handle just below neck, which is of same shape as that of the body of vase. Covered with splotches, which have run into another, of several dull colors, black, bottle-green, and deep lake, giving the appearance of mottled agate, under a thick glaze. The porcelain is coarsely crackled like ice. No mark. Height, $5\frac{1}{4}$ inches.

272. *Vase* of white Chienlung porcelain, of small *lancelle* shape, bearing chrysanthemum flowers and leaves engraved in paste, over which under a rich vitreous glaze is a wavy pattern in yellows and browns resembling agate. No mark. Height, $6\frac{1}{2}$ inches.
273. *Vase* of white Chienlung porcelain, bulging from above foot, then contracting concavely to form slender neck much everted at mouth. Decoration consists of bamboos and chrysanthemums outlined and shaded in black on deep blue ground, covered with thin but brilliant glaze. Edge of mouth black, inside plain white. No mark. Height, $11\frac{3}{8}$ inches.
- 274, 275. *Plates* (a pair) of white Chienlung porcelain coarsely crackled. Ornamented with circular splotches arranged in pattern round a large central one, in which white, red, and blue colors appear, giving each splotch the appearance of a crushed purplish red fruit. Covered with a thick vitreous glaze, which has collected between the splotches and thus formed a sort of frame-work of bottle-green hue. Outside similar splotches are arranged regularly around brim. A curious variety of *flambé* style. No mark. Diameter, $9\frac{3}{8}$ inches.

The use of spiked metal supports to keep vessels of porcelain in position within the kiln has been generally considered peculiar, in the East, to the Japanese system of manufacture. The marks of a seven-spiked stand on the feet of these plates show, however, that metal supports within the seggars have also, at least occasionally, been employed by the Chinese.

276. *Vase* of white Chienlung porcelain, of slender bulbous shape with long tapering neck, of the *flambé* variety. From its appearance one would judge the decoration to consist of a deep red ground on which has been blown (*soufflé*) a blue and white composition, which had formed a multitude of closely packed blue and white circles, of irregular edge owing to their having run in the baking, under a thick, brilliant vitreous glaze. At mouth the color has disappeared, discovering the white porcelain under a crackled glaze. Lower down inside the color re-appears. No mark. A very fine specimen. Height, 16 inches.
277. *Vase* of pure white Chienlung porcelain, of bulbous shape with long neck ending with a small globe. Inside without color. Outside it is entirely covered with a deep *sang-de-bœuf* red, with streaks like fleecy clouds of blue discovering white, the edges of which shade into black or very deep purple where the colors mingle, under a thick vitreous transparent glaze, crackled about mouth. No mark. An exceptionally fine specimen. Height, $13\frac{3}{4}$ inches.
278. *Fish-bowl* (small) of white Chienlung porcelain, globular, colored *sang-de-bœuf* under a deep vitreous glaze. Rim white; then, on inside, red close to rim, and lower down where glaze has run in baking, streaked—of good color. No mark. Height, 3 inches.
279. *Vase* of white Chienlung porcelain. Globular in shape, upper part of globe being cut at an angle of 45° to long neck which everts at mouth. On either side of neck is a handle formed by an elephant's head with inward curved trunk molded in relief on the paste. Covered with *flambé* colors, red, blue, and white, which both inside and out merge into one another, each predominating in turn, under a thick vitreous glaze pitted like orange-peel. Mouth rim remains white. No mark. Height, $14\frac{1}{8}$ inches.

280. *Vase* of white Chienlung porcelain, in shape of an inverted bulb, with small low neck covered with blue, red, and white *flambé*. Predominating color is red, but mottled with purple tints with blue and white appearing in places, under deep vitreous glaze pitted like orange-peel. No mark. Height, 8 inches.
- 281-284. *Screen panels* of white Chienlung porcelain. Two central panels, each $23\frac{3}{4}$ inches high by $9\frac{1}{2}$ inches broad, are flanked on either side by a panel of same height and $5\frac{1}{2}$ inches broad. On these is depicted, beautifully painted, Lao Tze, with lofty forehead and flowing white beard, in the mountain home of the Immortals, receiving two children riding the stag of longevity, with other children playing around, and genii coming to pay homage to the great sage, some on foot descending the mountains, some approaching on clouds, with Hsi Wang Mu herself preceded by her attendant birds (see No. 28). Around are twelve panels $3\frac{1}{2}$ inches wide and in length some $9\frac{1}{2}$ inches and some $11\frac{3}{8}$ inches, covered with formal lotus flowers and conventional scroll-like foliage, all in natural colors. A very beautiful piece of furniture, the frame being carved black wood.
285. *Fish-bowl* of thick white Chienlung porcelain, bulging gently from base to wide open mouth. Among thick fleecy clouds of soufflé blue-black is a very boldly drawn flying princely four-clawed dragon with row of large spines running along back, body of slightly yellow tinge, the scales beneath belly, horns and nose white. No mark. Height, $8\frac{1}{2}$ inches; diameter, $10\frac{3}{4}$ inches.
286. *Plate* of enamel upon copper base; decorated with a painting of Wang Chih watching two genii engaged in game of chess (see No. 18) under tree in valley between rising hills; confined above and below by band of foliated scroll pattern in black, picked out with gold on a light-blue ground; outside around rim a foliated scroll pattern in blue on white ground. Mark, a *fêng huang* (see No. 4). Diameter, $8\frac{3}{8}$ inches.
287. *Plate* of enamel upon copper base; decorated with a painting of the famous poet Li T'ai-po, and companion in open country among rocks and trees engaged in the enjoyment of wine, of which, to judge by the size of the blue jar in background, they have a plentiful supply; outside decoration and mark same as on last. Both admirably painted. Diameter, $8\frac{3}{8}$ inches.

Li T'ai-po (A. D. 699 to 762) is the most famous among the poets of China, and scarcely less noted for his love of wine. The curiosity of the Emperor Hsüan Tsung of the Sung dynasty having been aroused by the accounts made to him of the poet's genius, Li T'ai-po was summoned to an interview in the palace, where he was received with exaggerated honors. The Emperor himself handed the dishes, his favorite and haughty concubine was required to rub the ink for his use, and the chief eunuch and privy counsellor, Kao Li-Ss'un, had to divest him of his boots when overcome by wine. The Emperor's favorite, smarting under the indignity to which she thought herself subjected in his honor, barred the door to his official employment, and Li T'ai-po led "for the remainder of his life a wandering existence, celebrating in continual flights of verse the praises of bacchanalian enjoyment and of the beauties of nature in the various localities he visited." (Mayers.)

288. *Tea-pot* and cover of earthenware from the Ni-hsing district in Kiangsu province. Of globular shape much flattened. Round the lower portion are pine and plum trees very delicately molded in bold crisp relief; above, separated by a band of Grecian pattern incised in the paste, in single row of "old seal" characters in relief, from which it appears that the tea-pot was made at the special order of the Emperor Chienlung. On the cover is a scroll pattern, in relief, confined on either side by a band of Grecian pattern, and round the knob in the center is another band of same. A very beautiful specimen of this ware. Height, $2\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches.

SPECIAL GROUP OF EGG-SHELL PORCELAIN.

- 289-294. *Wine-cups* (6) of pure white Yunglo (1403 to 1424) porcelain of the variety termed *t'ò-t'ai*, "bodiless," or "egg-shell," with broad, open mouth. Round the sides is a delicate ornamentation of flowers and leaves faintly engraved in paste under a white enamel. On foot the mark, *Yung-lo-nien-chih*, in seal character—"Made during the Yung period"—engraved in the paste. Unique specimens at the present time. (See page 412.) Height, $1\frac{3}{8}$ inches; diameter, $3\frac{3}{8}$ inches.
295. *Bowl* of pure white Yunglo porcelain, called *t'ò t'ai*, or "egg-shell," or, perhaps, *h'an t'ò-t'ai*, "semi-bodiless," though a bowl of this size would have little practical utility were it of less substance. Covered with white enamel over imperial five-clawed dragons (see No. 4) among clouds faintly engraved in the paste. Mark same as on last. The ornamentation on this and the six last specimens becomes more distinct when the articles are filled with liquid. Height, $2\frac{3}{8}$ inches; diameter, 8 inches.
- 296-299. *Plates* (4), small, flat, of the very thin white Ch'ênghua (1465 to 1487) porcelain, termed *t'ò-t'ai*, or bodiless. Decorated with landscapes representing pavilions with beetling rocks behind on the bank of a lake or river, crossed by row-boats having mat awnings, and a lofty-peaked mountain in the dim haze of distance, painted in brilliant enamel colors above glaze. On brim, outside, are—three on each plate—sprays of roses, pinks, chrysanthemums, iris, lotus, and cœleus, also in brilliant enamel glaze. On foot, faintly engraved in paste, mark *Ch'êng-hua nien-chih*, "Made during the Ch'ênghua period." Very rare specimens. Diameter, $4\frac{1}{2}$ inches.
- 300-303. *Wine-cups* (4), of the very thin, pure white Ch'ênghua porcelain, termed *t'ò-t'ai*, "bodiless," or egg-shell. Small, tall, and slender, with everted rim. On each is a miniature group of the Seven Worthies of the Bamboo grove (v. No. 53) with an attendant bringing a jar of wine and flowers. The porcelain is so thin that the design, with all the details of color, can be distinctly perceived from the inside. Mark in blue characters under glaze *Ta-ming-ch'êng-hua-nien-chih*, "Made during the Ch'ênghua period of the Great Ming dynasty." Admirable specimens of the highly prized wine-cups of this period, which even in the sixteenth century brought extraordinary prices. (See preceding pages.) Height, $1\frac{1}{4}$ inches; diameter, 2 inches.
- 304-313. *Wine-cups* (10) of the thin, pure, white K'anghsi (1662 to 1722) porcelain, termed *t'ò-t'ai* "bodiless," with wide, open, everted mouth. Each is decorated with a single spray each of roses, red plum blossom, pomegranate, peach, *Pæonia moutan*, chrysanthemums, or of *yüan yang* (see No. 101) swimming among lotus flowers painted in enamel colors, the branches being outlined in blue under glaze. On each is a short poem extolling the beauty of the flower it accompanies. Mark on foot *Ta-ch'ing-k'ang-hsi-nien-chih*, "Made in the K'anghsi period of the Great Pure dynasty." Delicate specimens. Height, $1\frac{1}{8}$; diameter, $2\frac{1}{2}$ inches.
314. *Water-holder*, for use on student's table when preparing ink, of the pure white Yungchêng porcelain, termed *t'ò-t'ai*, "bodiless." In the form of a lotus leaf with crinkled edge, of which one-half (that forming the receptacle for water) turns up at edges, forming a small basin, which is half covered by the remainder of the leaf, arching over from the stalk. In the recess of the bent leaf are a pink, a beetle, and a fly, of tiny dimensions painted with extreme delicacy and care. The top of the stalk and veining of the leaf are incised in the paste, and, owing to the thinness of the latter, appear in relief underneath. A most beautiful specimen. Height, 1 inch; length, $3\frac{1}{4}$ inches.
- 315-318. *Wine-cups* (4) of thin, white Yungchêng (1723 to 1735) *t'ò-t'ai* or "bodiless" porcelain, of slender shape, with everted brim. Decorated with ideal land-

scapes exquisitely drawn and shaded in sepia under glaze. Mark *Tu-ch'ing-yung-chêng-nien-chih*, "Made in the Yungchêng period of the Great Pure dynasty." Height, $1\frac{3}{8}$ inches; diameter, $2\frac{1}{8}$ inches.

- 319, 320. *Plates* (a pair) of thin, white Chienlung (1736 to 1795) *t'o-t'ai* or "bodiless" porcelain. Covered with white enamel over in middle of plate two *ju-i* crossed (v. No. 81), with the figure of the two Primordial Essences (v. No. 40) in the center, and around the rim the eight Buddhistic emblems (v. No. 54), all faintly engraved in the paste. No mark. Exceptionally fine specimens. Diameter, $7\frac{1}{8}$ inches.
- 321, 322. *Rice-bowls* (a pair) of white Chienlung *t'o-t'ai* or "bodiless" porcelain. Covered with white enamel over scroll-like sprays of conventional lotus flowers (*hsi-fang-hen-hua* or lotus of the west) and leaves engraved in the paste inside and out, but in such manner that the two patterns do not coincide in their outlines, and that, if bowl be regarded from inside or from outside, the pattern on the side looked at is alone visible. Mark *Ta-ch'ing-chien-lung-nien-chih*, "Made in the Chienlung period of the first Great Pure dynasty," engraved in the paste under foot. Height, $2\frac{3}{8}$ inches; diameter, $5\frac{1}{4}$.

SPECIAL GROUP OF VITREOUS WARE AND OF PORCELAIN MADE, WITH IT AS MODEL, TO SECURE A LIKE TRANSPARENCY OF COLOR WITH INCREASED BRILLIANCY OF GROUND.

323. *Snuff-bottle* (small) of dull, opaque, white vitreous ware, of flat elongated *potiche* shape, decorated with red lotus flowers and green leaves. Mark *Ta-ch'ing-nien-chih*, "Made during the Great Pure dynasty," the distinctive mark of the earlier productions of Ku Yüeh-hsüan. (See page 423.) This ware is so highly esteemed by the Chinese that it sells for higher prices than would similar articles of jade. Height, $2\frac{1}{4}$ inches.
324. *Water-holder* (small) of dull, opaque, white Ku Yüeh-hsüan vitreous ware of cylindrical shape. Decorated with a landscape very beautifully painted in natural colors, representing a young shepherd clad in Chinese dress, but whose features are unmistakably European, tending a ram and two ewes on a grassy sward confined by lofty rocks, among which grow herbs and flowering trees. The painting is characterized by all the delicacy of touch of a miniature. Mark in form of a seal engraved in foot and filled with blue enamel, *Chien-lung-nien-chih*, "Made in the Chienlung (1736 to 1795) period." This and the next twelve specimens, *i. e.*, down to No. 336, inclusive, were made under the supervision of T'ang ying (see page 419). Height, $1\frac{1}{8}$ inches; diameter, $1\frac{1}{8}$ inches.
325. *Pencil-holder* of same ware, of cylindrical shape. Decorated with a group of the Seven Worthies of the Bamboo Grove (v. No. 53) conversing together or examining a large scroll bearing a landscape with large pine trees, on a green sward edged with beetling rocks and flowering trees. An exquisitely drawn picture. Mark as on last. Height, $2\frac{3}{8}$ inches; diameter, $2\frac{3}{8}$ inches.
326. *Wine-cup* (small) of same ware. Round the foot is a band of delicate red scroll-work on a yellow ground, with a very narrow band above of white foliate pattern on black ground. This and a broader foliate pattern at rim of the dull white color of the glass carefully shaded with straw-yellow upon a very pale green ground, confine the body of the cup, on which a yellow scroll-work forms two landscape panels. The intermediate spaces, slightly smaller than the panels themselves, are completely filled with peonies, chrysanthemums, convolvulus, lilies, asters, and many other flowers. A more artistic or delicately beautiful ornamentation than this and that of the following cup it would be difficult to find. Mark as on No. 324. Height, $1\frac{1}{8}$ inches; diameter, $2\frac{1}{8}$ inches.

327. *Wine-cup* (small) of same ware. Round the foot is a band of same pattern as in last with an arabesque pattern above in carmine on a pink ground. Within this and a similar band around brim are delicate foliate patterns of the dull white color of the glass shaded with light brown on a ground of the same color, which confine the body of the cup. Here on a ground of the natural color of the ware is a fine damask in olive-green supporting four panels confined by yellow scroll-work—two square and two oblong. The former contain valley landscape scenes in winter season, and the latter similar scenes in summer season, very delicately painted in deep pink or carmine. Mark as on No. 324. Height, $1\frac{1}{2}$ inches; diameter, 2 inches.

328, 329. *Rice-bowls* (a pair) of thin, pure white Yungch'eng (1723 to 1735) porcelain covered with a very brilliant, transparent vitreous glaze to secure the delicate transparency in the coloring remarkable in the Ku Yüeh-hsüan ware (Nos. 323 to 327), and hence termed, as are Nos. 330 to 336, by the Chinese, *fang-ku-züeh-hsüan*, modeled after that ware. Decorated with branching sprays of plum blossom beautifully drawn and shaded in sepia above the glaze, the artist's idea being explained by a stanza to the following effect:

The student sees the outline sharp
Of plum-bloom by the moonlight cast
On window blind, and breathes the scent
Of unseen flow'rets wafted past.

Mark as on No. 324. Height, $2\frac{1}{2}$ inches; diameter, $4\frac{1}{2}$ inches.

330. *Tea-pot* of pure white Chienlung porcelain of globular shape and covered with brilliant vitreous glaze, upon which are very beautifully painted groups of white and of pink lotus flowers, and leaves crinkled into many, but quite natural, shapes and showing the dark upper and light lower sides, with buds and seed-pods. On cover are groups of the same flowers and leaves arranged in three clumps around the knob, which is a flattened globe bearing the character *shou* (longevity) in carmine. On tea-pot is the inscription: "Pure as the virtue of the perfect man," that is, as jade, which from a passage in the "Classic of Ceremonial" is considered the symbol of such virtue, "harmonious as the strength of him who fulfills all his duties to his fellow-men." Mark as on No. 324. Height, $4\frac{1}{2}$ inches.

331, 332. *Cups* of same porcelain and bearing precisely the same decoration. No. 330 came from the collection of the Prince of I. Several months later these corresponding cups, which doubtless at one time belonged to the same owner, were purchased from among unclaimed goods in a Peking pawnshop. Curiously enough, however, the seal attached to the inscription on the cups, though this is evidently by the same hand as is that on the tea-pot, differs from the seal on the latter. Height, $1\frac{1}{2}$ inches; diameter, $2\frac{1}{2}$ inches.

333, 334. *Vases* (a pair) of pure white Chienlung porcelain, of flattened globular shape, with slender neck representing half total height, and everted brim, covered with brilliant vitreous glaze, on which the decoration is painted. Around the foot is a band of light blue ornamented with delicate foliate scroll in violet. Above the band runs another band of panel ornamentation in carmine edged with dull green, which, with a band below neck of conventional dragons, alternately green and pink, on a magenta ground, inclose the body of the vase. This, on a deep blue ground, ornamented with conventional clouds of yellow, green, blue, and red, and bats of pink shaded with carmine, and of yellow shaded with orange, bears four medallions with pure white ground of dazzling brilliancy, containing groups of flowers most delicately painted—peonies and bamboos; lilies, longevity fungus, and red-seeded heavenly bamboo (*Nandina domestica*), lilies and poppies, and yellow hibiscus and green and red cœleus. At foot of neck is a band of orange, the neck itself being of lemon yellow ornamented with conventional flowers and foliage in many colors, confined below by a band of foliated pattern in blue

shaded with deeper tones of the same color, and above by a similar band, outlined with a dotted border of blue, in carmine and shaded with the latter color, the decoration ending in a narrow border of pale yellow pattern outlined with black. The colors throughout are subdued in tone, producing a very rich and harmonious effect. Mark as on No. 324. Height, $7\frac{1}{4}$ inches.

335. *Bowl* (small) with slightly everted brim of thin white Chienlung porcelain covered with brilliant vitreous glaze. On a pale lemon yellow ground are large conventional peonies, of which the outer petals are of magenta purple and the inner petals of blue, having a magenta center, with buds of same colors, and leaves of various shades of green. Inside plain. Mark as on No. 324. Height, $2\frac{3}{8}$ inches; diameter, $4\frac{1}{4}$ inches.

336. *Vase* of pure white Chienlung porcelain covered with brilliant transparent vitreous glaze. Of very graceful shape, resembling a much-flattened bulb with long tapering neck which represents three-fifths of total height. Ornamented with beautifully drawn red roses, yellow orchids (*Malaxis* and *Epidendrum*) with leaves of deep green to former and of delicate grass green to latter. In this case at least the delicate transparency so admired on the real vitreous ware has been attained. Appended is the following inscription, sealed with the author's *noms de plume*; i. e., his favorite designations: "The four seasons changed to an everlasting spring," "The perfect man of pure and world-wide fame."

"As flow'rs imprison'd hold each eve
In loving clasp the sweet moon's rays,
So man, by loving flow'rs, each year
Surely prolongs his length of days."

337. *Vase* (small) of white Chiach'ing (1796 to 1820) porcelain, in shape of a gourd contracted in the middle. On either side is a medallion formed by the character *shou* (longevity) on the lower swelling, and on the upper by a grotesque winged bat, with two three-clawed dragons curling from top and encircling the lower (*shou* character) medallion. The dragons have foliated flames springing from their sides. The decoration, which is well drawn and shaded in deep blue under glaze, is completed by a band of Grecian pattern round the foot and by a band of foliated scroll-work round the rim. Mark *Ta-ch'ing-chiach'ing-nien-chih*: "Made during the Chiach'ing period of the Great Pure dynasty." Height, 7 inches.

- 338, 339. *Bowls* for growing narcissus, of white Chiach'ing porcelain of ovate shape divided into four scallops. Between a band at rim and another at foot of foliated scroll pattern is the decoration in chief, which, on each curved panel or scallop, consists of a character *shou* (longevity) in seal form surmounted by a bat, the decoration thus signifying "long age and every happiness," and supported on either side by conventional (or western) lotus flowers and leaves. The decoration is throughout in relief in whitish celadon on a ground of dark celadon. Mark as on No. 337. Height, $2\frac{1}{4}$ inches; length, $7\frac{3}{4}$ inches.

340. *Vase* of white Chiach'ing porcelain, of slender bulbous shape with long tapering neck, covered inside and out with deep green glaze (known to the Chinese as "apple-green") closely crackled. Mark as on No. 337. Height, $12\frac{1}{4}$ inches.

- 341, 342. *Plates* of white Chiach'ing porcelain with scalloped edges. Inside are five bats surrounding a medallion formed of the seal character *shou*—i. e., long life and every happiness—in vermilion, shaded, on a white ground. On outside, round the convex brim are branching sprays of plum blossom and two birds left white on a vermilion ground and shaded with the color of the ground. Mark as on No. 337. Diameter, $5\frac{7}{8}$ inches.

343. *Bowl* (small) of white Chiach'ing porcelain, with everted brim. Inside plain. Outside entirely covered with flowers of many varieties in red and cream yellow on white ground—hence termed by the Chinese “cup of 100 flowers”. Mark as on No. 337. Height, $2\frac{1}{4}$ inches; diameter, 4 inches.
344. *Vase* of white Chiach'ing porcelain, of cylindrical shape, with low neck slightly everted and, on either side, below contraction toward neck a handle in shape of an ancient altar, covered entirely with an olive green dappled (*souffle*) with deep blue black. Mark as on No. 337. Height, $9\frac{1}{4}$ inches.
345. *Snuff bottle* of enamel upon copper, of flattened globular shape. Body is entirely covered with a representation of a celebrated “picture of the hundred children” playing in a garden with pavilion and trees, etc., painted with great care and detail. On the neck are a band of foliate scroll pattern in deep blue upon a ground of very light shade of same color, and above it a band of delicate yellow-brown grass on a ground of light green. Mark as on No. 337. Height, $2\frac{1}{2}$ inches.
- 346, 347. *Bowls* (large), a pair, of white Taokuang (1821 to 1851) porcelain with wide open mouths. Inside plain. Outside sprays of bamboos, with crisp, bold outline left white upon a deep brick-red ground. Mark *Ta-ch'ing-tao-kuang-nien-chih*: “Made in the Taokuang period of the Great Pure dynasty.” Height, $2\frac{3}{8}$ inches; diameter, $7\frac{1}{2}$ inches.
348. *Tea-cup* and cover of thin white Taokuang porcelain, with wavy brim. On a ground of waves closely engraved in paste are Han Hsiang-tz'u and an attendant sailing on a tree towards a pavilion far away in the clouds, and on the cover is a woman (? Lao-yü) riding a *fêng-huang* (see No. 4) toward a distant pavilion among the clouds. Mark as on last. Height, $3\frac{3}{8}$ inches; diameter, 4 inches.

Han Hsiang-tz'u is one of the Eight Immortals of Taoist fable. He was an ardent votary of transcendental study, to whom Lü Tung-piu, another of the Immortals, appeared and made him his pupil. He is represented riding upon a tree trunk to immortality, in reference to the legend that having been carried into the peach-tree of the genii (see No. 27) he fell from the branches and entered upon a state of immortality.

349. *Pencil holder* of unglazed pure white Taokuang biscuit, of broad cylindrical shape. Decorated with a landscape of good design molded in high relief, representing an old man riding a mule, followed by an attendant, over a two-arched stone bridge across a mountain torrent towards a monastery built among a grove of trees on a valley slope. Behind are towering hills, with roofs of other monasteries and a pagoda appearing here and there among the peaks. Mark as on No. 346 in relief. Fine specimen. Height, $5\frac{3}{8}$ inches; diameter, $4\frac{1}{2}$ inches.
- 350-352. *Wine cups* (3) of white Taokuang porcelain. Inside, at bottom, is a pink lotus flower bearing in center a Buddhistic ornament in gold. On outside around the brim is a border of the Eight Buddhistic Emblems (see No. 54) in vermilion, each two being separated by a *shou* or “longevity” character in seal form in pale green. Below are the seven paraphernalia of a *Chakravartti* or universal sovereign (Sanskrit *Sapta Ratna*). Between each pair is, below, a small castle on rocks; above, grotesque animals' heads with dependent bead-fringe—all painted in colors and gold. Mark in Mongolian characters *Baragon Tumet*. Height, $1\frac{1}{2}$ inches; diameter, $2\frac{1}{4}$ inches.

Mark. A daughter of the Emperor Taokuang married the Prince of Western Tumet, a principality of Southern Mongolia, and these cups are probably part of a service made for her as a wedding present at the Imperial potteries.

The *Sapta Ratna* consist of (1) the golden wheel or disc, (2) lovely female consorts, (3) horses, (4) elephants, (5) divine guardians of the treasury, (6) ministers in command of armies, and (7) the wonder-working pearl.

- 353, 356, 366. *Rice-bowls* (3) of pure white Taokuang porcelain with slightly everted brim. Inside at bottom, within a double ring are sprays of chrysanthemum, peony, plum blossom, and pine, and around the sides four large sprays of the same plants, the pine, however, giving place to the lotus. Outside on a ground covered with a foliate design closely engraved in the paste under a lemon-yellow glaze are four pure white medallions, gold-edged, containing groups of peony, *Magnolia yulan*, plum, chrysanthemum, and lotus beautifully painted. Between the medallions are longevity fungus and conventional lotus with scroll-like foliage. Mark as on No. 346. Height, $2\frac{5}{8}$, $2\frac{1}{2}$, and $2\frac{3}{4}$ inches; diameter, $5\frac{3}{4}$, $5\frac{3}{4}$, and $5\frac{3}{4}$ inches.
- 354, 355. *Rice-bowls* (a pair) of pure white Taokuang porcelain with slightly everted brim. Inside is a star-like decoration at bottom with eight foliated points in vermilion, shaded with deeper tones of the same color and outlined with gold, between the points being conventional flowers of deep blue shaded with darker blue. The outside decoration is same as on last except that the four medallions, instead of containing flowers, are ornamented with landscapes of lake and mountain scenery, representing the four seasons. Mark as on No. 346. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{1}{2}$ inches.
357. *Rice-bowl* of pure white Taokuang porcelain. On a ground closely covered with a foliate pattern engraved in the paste under a lemon-yellow glaze are vases decorated with blue containing sprays of peony, a plate of pomegranates, etc., in enamel colors. Between the flowers are three gold-edged medallions containing, one a water buffalo, another a ram, and a third a ewe in grassy meadows with flowering trees. Mark as on No. 346. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{1}{4}$ inches.
- 358, 359. *Rice-bowls* (a pair) of pure white Taokuang porcelain with slightly everted brim. Inside, at bottom, within a double circle is the philosopher Lao T'ze, (see No. 54) riding on a water buffalo meeting the Queen of the Fairies, Hsi Wang-mu (see No. 28), at whose feet are a number of birds, with clouds and birds around, all in blue shaded with deeper tones of the same color. Outside on a ground closely covered with a foliated pattern engraved in the paste under a deep blue glaze are four medallions, gold-edged, and in spaces between them are cumulus clouds in various colors. On the medallions are four mythological subjects which have eluded efforts at identification, viz, two maidens in a pavilion among trees and rocks; three maidens in a meadow under the shade of trees approaching an altar; a maiden clad in a green robe and holding a rope, seated upon a cloud with seven magpies at her feet; and, lastly, a maiden in a red robe upon a cloud also with seven magpies. Mark as on No. 346. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{1}{4}$ inches.
- 360, 364. *Rice-bowls* (a pair) of pure white Taokuang porcelain. Inside at bottom within a double circle is a wicker hand-basket containing chrysanthemums, peonies, and other flowers, around which are four groups of longevity fungus, plum blossom, pomegranate, chrysanthemums, and grass in deep blue shaded with darker tones of same color. Outside on a ground closely covered with foliated pattern engraved in paste under a deep magenta glaze, bearing conventional lotus flowers with scroll-like foliage in enamel colors, are four gold-edged medallions containing sprays of red and of purple peonies alternating with groups of pomegranate flowers and fruit on a pure white ground. Mark as on No. 346. Height, $2\frac{5}{8}$ inches; diameter, $5\frac{3}{4}$ inches.
- 361, 365. *Rice-bowls* (a pair) of pure white Taokuang porcelain. Color and decoration same as on No. 240. Mark as on No. 346. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{3}{4}$ inches.

- 362, 363. *Rice-bowls* (a pair) of pure white Taokuang porcelain, slightly everted at brim. On inside are five bats in vermilion (symbolical of the five happinesses, see No. 27), irregularly placed at bottom. On outside are iris, the veining, etc., being in thick color in high relief, conventional pink lotus, red peony, and flowers resembling the fox-glove and blue corn-flower, with scroll-like foliage, all beautifully drawn in enamel colors of bright tints on thick pale lemon-yellow ground. Mark as on No. 346. Height, $2\frac{1}{2}$ inches; diameter, $5\frac{1}{4}$ inches.
367. *Bowl* (small) of white Taokuang porcelain, with everted brim. Decorated with a spray of white plum and longevity fungus beautifully painted, and a poem from the pen of the Emperor Taokuang and bearing his seal. Mark *Shên-tê-t'ang*, a designation applied by that Emperor to a portion of the Imperial apartments and inscribed on the porcelain specially ordered by him for use there. Height, $2\frac{1}{4}$ inches; diameter, $4\frac{1}{4}$ inches.
368. *Circular dish* of white Taokuang porcelain, decorated with sprays of peonies in vermilion below glaze and pink above glaze, and delicately painted butterflies and bees hovering over the flowers, the sprays spreading around the rim and then crossing the brim cover the interior of the dish. Mark as on last. Height, $1\frac{1}{2}$ inches; diameter, $6\frac{3}{8}$ inches.
- 369, 370. *Rice-bowls* (large, a pair) of white Taokuang porcelain. Inside plain. Outside, on a plain white ground not engraved, is the same decoration as on No. 240. The mark for some reason has been ground away. Height, $2\frac{3}{4}$ inches; diameter, $6\frac{1}{2}$ inches.
371. *Jar* of earthenware. The ornamentation, which is in high relief, consists of two bands of foliate scroll-work, confining an umbrella, a cylindrical flower-pot containing cœsus, a gourd-shaped vase, and two rolled-up painting scrolls crossed, alternating with sheaves of ornate foliage, under a black-green glaze. Height, $3\frac{3}{4}$ inches.
- 372-375. Plates (4) of pure white Taokuang porcelain covered with brilliant glaze and decorated with beautifully painted sprays of white plum blossom and of pink roses, which, after trailing around the deep rim, cross the brim and cover the inside of the plate. Mark as on No. 346. Diameter, $4\frac{7}{8}$ inches.

MISCELLANEOUS COLLECTION OF SNUFF-BOTTLES.

376. Of white porcelain and flat circular shape, formed by two lotus leaves, one of deep red grading into light green at center, the other of deep green grading into pink at center, with butterfly settled upon each. Admirably molded. No mark.
377. Of white porcelain and ovate shape, decorated on one side with a Chinese rebus, three shrimps grasping reeds, which reads *San-hsia mi-Ch'uan-lu*. If the third character be omitted, the phrase—by the substitution of characters differently written, but having the same pronunciation—means “three generations have gained a place in the first class at the highest literary examinations.” On the opposite side, eighteen crabs, a similar rebus, meaning “at eighteen gained second place at the highest literary examination.” Mark *Tao-kuang-nien-chih*: “Made in reign of Taokuang.”
378. Of white porcelain, in shape of a young girl, dressed in a jacket of blue damask and trousers of red brocaded with gold. She has the contracted feet of the Chinese women. Body hollow, stopper formed by one foot, which is removable from trousers. No mark.
379. Of white porcelain in shape of a boy, intended to represent T'ung Fang-so (see No. 27), dressed in a robe of red brocaded with gold, open to skin from neck to waist, green undergarments, and a summer season official hat, which is removable and forms stopper. No mark.

380. Of white Chienlung (1736-1795) porcelain and flat ovate form. The cream-yellow paste is engraved to represent waves, on which a boat containing two of the Eight Immortals (one male and one female, see No. 172) is being rowed among lotus flowers. Molded in high relief and painted in enamel colors. Fine specimen. Mark *Ta-ch'ing chien-lung-nien-chih*.
381. Of white porcelain and flat ovate shape. Decorated in colors with a rebus on either side—a saddled elephant bearing a jar-shaped houdah, reading in Chinese *Hsiang pei t'ai p'ing*, which also means "Peace rules in the north," and a tub full of green growing wheat, reading *i t'ung ta ch'ing*, "the whole Empire (owns) the Great Pure dynasty." Mark, *Chien-an-ya-Chih*: "Made for Chien An-ya," an unidentified name.
382. Of white Chienlung (1736 to 1795) porcelain and of flat circular shape, decorated with mythological personages painted in colors. Mark as on No. 380.
383. Of white Chienlung porcelain and of small *potiche* shape, decorated with plumb trees of the pink and white blossom varieties, perched on which and on ground are one hundred magpies, symbolizing "a hundred, i. e. every kind of happiness," the magpie, from its merry-sounding chatter, being termed "the bird of happiness." Mark as on No. 380.

The magpie is especially dear to the present occupants of the throne of China from the part it played in the divine origin of their first ancestor. "The Chinese chronicle runs as follows: 'Immediately east of the pumice peaks of the Ch'ang-hai-Shan (Long White Mountain) is a high mountain called Bukuli, at the foot of which is the small lake or pool Buhuli. After bathing one day in this pool, the maiden Li Fokulun found on the skirt of her raiment, placed there by a magpie, a fruit which she ate, and which caused her to give birth to a boy of an appearance different from ordinary people, whence she called him *You heaven-born to restore order to the disturbed nations*. His surname she called Aisin-Gioro, his name Bukui-yung-shun. She disappeared, and he, embarking in a small boat, floated with the river stream. In the neighborhood of a place where peoples of three surnames were at war, he disembarked, and was breaking off willow branches, when one of the warriors, coming to draw water, saw him. Amazed at his strange appearance, the warrior hastily retired to inform the people of the remarkable man he had seen. The curious people went to the bank and asked his name and surname, to whom he replied: *I am the son of the heavenly maiden Fokulun, ordained by heaven to restore peace among you*, and thereupon they nominated him king, and he reigned there in Odoli City, in the desert of Omohi, east of Ch'ang-hai-Shan." Another version of the legend states that there were three heavenly maidens Angela, Changhela, and Fokulun. The first two returned to heaven, while Fokulun remained on earth to nurse the miraculous babe till he grew up. Then she told him to wait till a man came to fish. The fisherman came and adopted the boy, and Fokulun ascended to heaven. Père Amyot, from whom this account is taken, identifies Fokulun with a sixteen-armed goddess whom he calls Pussa, or the Chinese Cybele, but described at the present day as a Boddhisatwa, a celestial candidate for Buddhahood. The story continues that Aisin-Gioro, in spite of his heavenly birth, was put to death by his people, and only his youngest son, Fancha, escaped by the aid of a magpie, which alighted on his head as he ran and made his pursuers think him the stump of a tree. Fancha fled from Odoli across the Ch'ang-hai-Shan to Hotuala and there, some two centuries before the birth of Nurhachu, the first Manchu chieftain who took up arms against the Chinese, he laid the foundations of the future dynasty of China." (James, "The Long White Mountain," p. 31.)

384. Of white porcelain and bulging cylindrical shape, bearing an Imperial five-clawed dragon, well drawn in blue under glaze twisting around the bottle. No mark. Height, $3\frac{3}{4}$ inches.
385. Of white porcelain. Cylindrical in shape, the lower portion divided into two fluted sections by three double bands. Decoration, branches of pine, bamboo, and plum-blossom, symbolical of long life (see No. 181), in deep blue under glaze. No mark. Height, 3 inches.
386. Of rock crystal. Flat and circular in shape, the two faces of a Carolus dollar being carved in relief on the sides. No mark.
387. Of agate; shape, a flat oblong with beveled corners, showing an admirable representation of a horse feeding, naturally formed in the stone, in brown on a dull opaque white ground. No mark.
388. Of pure white porcelain and of much flattened globe shape, decorated with a rebus on either side admirably painted in deep blue under glaze: (1) three crabs holding reeds, reading *san p'ang hsieh ch'uan lu*, and also meaning "three generations gain the first class at the metropolitan examinations;" (2) two pigeons perched in a willow tree, reading *esh pa (k'o) téng k'ei*, and also meaning "at eighteen to be successful in the examinations." Mark *Yün-shih-ya-chih*; "made for *Yün Shih-ya*"—an unidentified name.
389. Of white porcelain, tall and cylindrical in shape; decorated with children playing, of the natural color of the porcelain on a ground covered with thick black glaze. No mark.
390. Of brown agate and ovate in shape. The surface is carved so as to show monkeys of a yellow-white color gamboling in trees and on ground.
391. Of white porcelain covered with a dark olive or "tea-dust" (*Ch'a-mo*) glaze and pear-shaped.
392. Of cream-white porcelain and of ovate form. On a light green ground molded to represent waves are the Eighteen *lohan* (Chiu.) or *arhat* (Sanskrit), the immediate disciples of the Buddha (see No. 32) molded in high relief, confined above and below by a narrow waving border of brick red. On the cover are waving bands of brick red and green alternately. Good specimen. No mark.
393. Of white porcelain and globular shape, decorated with an imperial five-clawed dragon in clouds pursuing sun, painted in vermilion. Mark, a dragon.
394. Of white porcelain and shaped as a small jar with wide mouth; decorated with landscapes in deep blue under glaze. No mark.
395. Of white Yungchêng (1723 to 1735) porcelain and of cylindrical shape; ornamented with imperial five-clawed dragons amidst clouds engraved in the paste under a brilliant white glaze. Mark as on No. 85.
396. Of white porcelain and of bulbous shape with slender neck, covered with a mottled decoration of white, blue, and red wavy streaks. No mark.
397. Of white Yungchêng (1723 to 1735) porcelain and of elongated globular shape, decorated with a representation of two of the Seven Worthies of the Bamboo Grove (see No. 53) with attendant carrying books, under a tree near entrance to a pavilion, in deep blue under glaze. Mark as on No. 85.
398. Of coarse porcelain, said to be of Sung dynasty (960 to 1278), and of globular shape with short neck and everted brim, covered with thick white glaze coarsely crackled. No mark.
399. Of white porcelain and jar-shaped with wide mouth; decorated with imperial five-clawed dragons with open mouths and red tongues rising from waves and flying through clouds in pursuit of sun—all in deep green. Broad flat cover ornamented with a similar dragon "sitting" in deep green. Mark as on No. 346.
400. Of white porcelain and cylindrical in shape, decorated with a group of lotus flowers and leaves, and flags in deep blue under glaze. No mark.

401. Of white porcelain and of slender *lancelle* form, bearing conventional lotus flowers (the so-called "Western lotus") and leaves, engraved in the paste under brilliant glaze. No mark.
402. Of white Yungchéng (1723 to 1735) porcelain and of cylindrical shape, decorated with painting in deep blue under glaze of a wrestling match in the courtyard of a *yamén* or official residence, in presence of the occupant. Mark as on No. 85.
403. Of white porcelain covered with a crackled glaze and molded in form of a rat feeding on a corn cob it is holding between its feet. No mark.
404. Of white porcelain and of circular shape, decorated with a landscape in colors. Mark (unidentified), "Yu-t'ang-ya."
405. Of white porcelain and of bulbous shape, with slender neck; decorated with painting in deep blue under glaze, representing the Eighteen Lohan (Chin.) or Arhat (Sansk.), the immediate disciples of the Buddha (see No. 32). The mark attributes the snuff-bottle to the Ch'ênghua period (1465 to 1487), but it more probably belongs to the K'anghsi (1662 to 1722).
406. Of white porcelain and of bulbous shape, with tapering neck, covered with a brilliant deep blue (*bleu de roi*) glaze. No mark.
407. Of creamy white porcelain and of flattened, circular shape; on a ground representing waves engraved in paste are genii paying homage to the maiden immortal Ho Hsien-Ku (see No. 32). A fine specimen of this ware. No mark.
408. Of white porcelain and of tall, ovate form, with cup-shaped neck; well molded in open-work representing imperial five-clawed dragons amid clouds and flame, confined at top by foliate scroll and Grecian pattern bands, all colored deep vermilion; cover to match. No mark.
409. Of white Ming dynasty porcelain and of tall, cylindrical shape, decorated with a painting in blue and vermilion under glaze of the Three Heroes, Chang Liang, Ch'ên P'ing, and Han Hsin. No mark.

Chang Liang was one of the earliest adherents and afterwards chief counsellor of Lin Pang, the founder of the Han dynasty, whose cause he embraced B. C. 208, and to whose triumph he materially contributed by his wise counsels. He died B. C. 189.

Ch'ên P'ing was of very humble origin, but his virtue having brought him into prominent notice he rose to high rank. Subsequently, like Chang Liang, he espoused the cause of Lin Pang B. C. 205, and made himself famous on six occasions by master strokes of policy, which greatly aided the successful issue of the contest for the throne.

Han Hsin was a grandson of the Prince of Han, whose territory had been seized by the Ch'in dynasty. He also espoused the cause of Lin Pang, whose armies he commanded. After subjugating principality after principality he was raised to princely rank, but having been accused of high treason his person was seized. He was, however, amnestied and given the government of T'ai yüan, but again fell under suspicion and this time executed by the Empress Lü B. C. 196.

410. Of white porcelain and pear-shaped. On a white ground closely covered with peony sprays bearing blue leaves and vermilion flowers and buds is an imperial five-clawed dragon, also in vermilion. No mark.
411. Of white Yungchéng porcelain and of cylindrical shape, decorated with a painting in brilliant blue under glaze, in the autumn evening (as the accompanying inscription states) an old gentleman, followed by attendant holding an umbrella over his head, enters a lamp-hung ferry-boat to cross the river. Mark as on No. 85.
412. Of white porcelain and of pear shape. The ornamentation is of unusual style, and seems to show the impress of Japanese influence. On a ground of magenta-vermilion appear medallions of the natural color of the porcelain,

on one of which is the character *shou* (longevity), on another pomegranate fruit, on another a group of pine, bamboo, and plum blossom (symbolical of long life; see No. 181), and on others conventional flowers or diaper patterns. No mark.

413. Of white unglazed (biscuit) porcelain, and of flattened globular shape, bearing four-clawed dragons rising from waves and flying through flames and clouds in pursuit of sun, drawn and shaded in black. No mark.
414. Of white Chienlung (1736 to 1795) porcelain, and of flat, jar shape. On either face, on white ground, sprays of peony, chrysanthemums, and other flowers springing from among rocks, painted in enamel colors. Round the sides and on neck conventional flowers and scroll-like foliage in vermilion. Mark, *Chien-lung-nien-chih*, "Made during reign of Chienlung."
415. Of white porcelain and of squat jar shape, covered with thick, black glaze, except on portions where appears the decoration, which is in blue under white glaze, and represents a father's return home. The son runs to meet him, while the wife, seated on a stool, awaits his coming, behind her being a large loom at which she has been working. Broad, flat cover of porcelain in imitation of jade, ornamented with the figure of *yin-yang*, the Two Primordial Essences (see No. 40). No mark.
416. Of agate. A life-like representation of a toad with wart-like excrescences all over the back. Handle of spoon is of deep-red coral elaborately carved into a bunch of peonies and leaves.

MISCELLANEOUS COLLECTION OF BRONZES.

417. *Low, open tripod brazier*, bearing three long panels, of which the ground is excised, leaving Arabic characters in relief. Mark in relief *K'ai-yüan-nien-chih* "Made in the K'ai-yüan period" of the T'ang dynasty, A. D. 713 to 842. Height, $5\frac{1}{2}$ inches; diameter, $10\frac{1}{2}$ inches.
418. *Incense-burner*, in shape of a beautifully formed fruit of the "Buddha's hand" citron (*Citrus sarcodactylus*), hollowed out to hold incense. Beneath, at lower end, is a knotted stalk which forms the handle and passes under the fruit so that the joints form supports on which the fruit rests, and leaves curl along its side. Mark in relief, *Ta-ming Hsüan-té-nien-chih* "Made in the Hsüan-té period (1426 to 1435) of the great Ming dynasty." Length, 9 inches.
- 419,420. *Candlesticks* (a pair). From hexagonal pots on carved stands rises a lotus stalk from which springs a bunch of buds and leaves, the central stalk bearing a fully opened flower which holds candle. Delicately modeled and of good workmanship. Probably of same date as last. Height, $13\frac{1}{2}$ inches.
421. *Tripod incense-burner*, formed of a circular bowl having a band of Grecian pattern round the rim and lotus flowers in relief below, and resting on three feet formed of elephants' heads, richly harnessed, with curved trunks. A handle on either side formed of similar elephant's head. The cover is formed of an elephant lying down among lotus flowers in open-work, and bearing on its back a basket of fruit. Height, $7\frac{3}{8}$ inches; diameter, $3\frac{5}{8}$ inches.
422. *Vase*.—Around rim is a band of Grecian pattern with a deep band of foliated scroll-work below. The body is divided by two raised bands, the upper one almost in middle of the vase, between which are the character *Shou* (longevity), forming medallions, with two bats on either side; outside of this division a geometrical pattern resembling honey-comb, with a small medallion of divinities in center. Round the foot a band of geometrical panel scroll-work. On either side, on level of the upper raised band already mentioned, is a handle formed by a rectangular projection inlaid with silver, supporting a lion or "dog of Fo." The ornamentation throughout is inlaid with silver. Marked Ssü Lou, a famous maker of the Sung dynasty (960 to 1278), but in reality an imitation, of comparatively modern date.

- 423, 424. *Snuff-bottles* of flat oblong shape with beveled corners. On a ground divided by bands into small squares, each containing a flower, is a central medallion containing immortelles. Ornamentation throughout in silver. Mark as on last.
425. *Pencil-holder* of cylindrical shape, bearing a landscape of river scenery with lofty, well-wooded mountains rising on either side, beautifully drawn and inlaid with gold.
426. *Incense-burner* of open circular shape standing on three feet. Upon a ground of lines of Grecian pattern are four small medallions containing grotesque animals. Round the rim and the tall looped handles rising from it is a wavy pattern in inlaid silver, the ornamentation throughout being similarly inlaid. Mark as on No. 422.
427. *Fessel* (small) formed of a removable cup fitting into a circular body, lined with silver and decorated with inlaid work in the same metal. On the cup, on a ground of foliate pattern, confined above and below by a band of Grecian pattern, are four small medallions containing landscapes. The circular lower portion bears similar decoration. Good specimen.
428. *Tripod incense-burner* of circular shape on tall, slender feet; on body and legs a wavy, cloud-like pattern in outline; round the sides of rim and of tall rounded handles a band of Grecian pattern; on top of rim a scroll pattern, ornamentation throughout being inlaid in silver. Mark Ssü Lou, this being a bona fide specimen of the work of this celebrated artist of the Sung dynasty much prized by Chinese connoisseurs. Height, 4 inches.
429. *Tripod incense-burner* of circular shape on low feet, with cover. The body is ornamented with very delicately drawn landscapes inlaid with gold, having on either side a gilt lion-head handle. Cover in open-work resembling a closely-spoked wheel, surmounted by a lion, all gilt. No mark. Height, $3\frac{3}{8}$ inches.
430. *Tripod incense-burner* of circular shape on low feet. Body ornamented in manner similar to last and with similar handles. Cover consists of open-work flowers and foliage surmounted by a lion in relief, all gilt. No mark. Height, $3\frac{3}{8}$ inches.
431. *Tripod incense-burner* of circular shape on low feet. On body, between two gilt lion-head handles, are two panels on which are sculptured in relief and gilt sprays of plum-blossom, chrysanthemum, etc., and the mythical creatures *fênghuang* (see No. 4) and *ch'ilin*. Cover consists of open-work chrysanthemums and leaves surmounted by a lion, all gilt. No mark. Height, $4\frac{1}{2}$ inches.
- Ch'ilin*, *ch'i* being the designation of the male, and *lin* of the female, is the generic name of one of the four supernatural creatures of Chinese tradition. It is described as being the body of a deer, the tail of an ox, and a single horn, and as being the noblest form of animal creation. It is said to attain the age of one thousand years, and to be the emblem of perfect good, its apparition being considered the happy portent of good government, or of the birth of virtuous rulers. Nevertheless, the apparition of one of these marvelous beasts was considered by Confucius as an omen of approaching evil, so manifestly inappropriate was it to the disorder of his times; and he concluded the history of his native state of Lu with the record of this event.
432. *Tripod incense-burner*, of broad, circular shape, on low feet. Round the sides of brim and of tall rounded handles runs a Grecian pattern. On body, covered with square diaper pattern, containing in each diaper a flower of five rounded petals, are four panels containing representations inlaid in silver, as is the rest of the ornamentation, of grotesque animals. Mark as on No. 422. Height, $4\frac{1}{2}$ inches.

- 433-434. *Pencil-holders* of cylindrical shape, in imitation of basket-work, over which are crawling tortoises and frogs, evidently of Japanese manufacture.

MISCELLANEOUS COLLECTION OF OLD LACQUER-WARE.

435. *Box* of scalloped circular shape. On top, over ground of dark-green diaper, a landscape in red lacquer carved in relief, with a number of children playing. The sides are ornamented with a carved diaper pattern, the scallops being red, and deep green, with red centers alternately. This and two following numbers are specimens of the celebrated lacquer-ware produced at Suchon, in Kiangen province, during the reigns of Yungchêng and of Chienlung. Height, $1\frac{3}{4}$ inches; diameter, $3\frac{1}{4}$ inches.
436. *Box* of circular shape and of red color throughout. On a diaper ground are sprays of plum-blossom and fruit in high relief, the fruit being diapered like the ground. Height, $2\frac{1}{4}$ inches; diameter, $5\frac{3}{8}$ inches.
437. *Snuff bottle*, heart shape. On a diaper ground of deep green are sprays of plum-blossom, *Malaxis* and *Epidendrum*, and longevity fungus in high relief, in red. Height, $2\frac{5}{8}$ inches.
438. *Ivory*, representing four segments of bamboo, in the interior of each of which is a spray of lotus, of plum-blossom, of peony, and of chrysanthemum, respectively, beautifully carved out of a solid block. Admirable specimen of old ivory carving. Length, $2\frac{3}{4}$ inches; diameter, $1\frac{2}{8}$ inches.

THE EXPEDITION TO FUNK ISLAND, WITH OBSERVATIONS UPON THE HISTORY AND ANATOMY OF THE GREAT AUK.

By FREDERIC A. LUCAS.

NOTE.—In 1835 the writer suggested to Professor Baird the desirability of visiting Funk Island for the purpose of obtaining remains of the Great Auk, but in view of the attendant expense and many difficulties to be surmounted, the project was not then carried out.

In 1887 Professor Baird decided to send the U. S. Fish Commission schooner *Grampus* to northeastern Newfoundland and Labrador to investigate the truth of the many reports of the abundance of mackerel in the adjacent waters, and since the route proposed would take the vessel to the vicinity of Funk Island, the writer was detailed to accompany the expedition.

The *Grampus* left Gloucester, Massachusetts, on July 2, and returned to Wood's Holl, Massachusetts, on September 2, having visited the following places: the Magdalen Islands, Bird Rocks, St. Johns, Newfoundland; Funk Island, Penguin Islands, off Cape Freels; Seldom-Come-Ry, Fogo Island; Toulunguet, Canada Bay, Black Bay, Labrador; Mingan Islands, and Percé, Canada.

So far as possible collections were made at these localities, and while in many the fauna was extremely scanty, the material obtained was extremely valuable.

The collection of bones of the Great Auk obtained at Funk Island equaled in extent all other existing collections combined, and the opportunity was afforded for thoroughly exploring this interesting spot for the first time.

Professor Baird never knew of the complete success of the expedition, and the sad intelligence of his death reached the party at Port Hawkesbury, Nova Scotia, while on its return.

A.—THE BIRD ROCKS AND FUNK ISLAND IN 1887.

It is now about fifty years since the Great Auk succumbed to the incessant persecution of man, disappeared almost simultaneously from the shores of Europe and America, and became extinct.

Found along the coast of Newfoundland by the early explorers, the countless myriads of this flightless fowl had been hunted to the death with the murderous instincts and disregard for the morrow so characteristic of the white race.

While from a strictly utilitarian stand-point there may be no reason to mourn for the Great Auk, the naturalist can but regret its wanton destruction and deplore the loss of so interesting a bird.

As the buffalo contributed to the opening of the great West, and the Rhytina aided in the exploration of the northwest coast, the Great Auk played its part in settling Newfoundland, and we may derive what consolation we can from Richard Whitbourne's *dictum* that "God made the innocency of so poor a creature to become such an admirable instrument for the sustentation of man."

The early navigators, the French fishermen and the English colonists, each availed themselves to the utmost of the store of this sea-fowl which a (to the unfeathered bipeds) kindly Providence had placed at their disposal.

For many years the birds were used for provision, both fresh and salted, and probably for bait by the fishermen, but great as was the drain made on the birds for these purposes it seems unlikely that this alone would have caused their extermination in so short a time, as the Great Auk was not such a delicacy that unusual efforts would have been made to obtain it.

The trade in feathers must probably be debited with having caused the destruction of the species, for although there seem to be no data showing when or why the demand for Auk feathers arose, there are references to it in various works on Newfoundland, which seem to be corroborated by the hundreds of thousands of Auks whose bodies were left to molder on the heights of Funk Island.

Cartier, who visited this spot in 1534, makes mention of the bird under the name of Apponath, and in the chronicles of voyages from 1536 onward, it is frequently spoken of under the title of Penguin.*

There is reason to believe that the Garefowl was abundant at Penguin Islands, off Cape la Hune, on the southern coast of Newfoundland, and although it is difficult to certainly identify this as the Island of Penguins mentioned by Master Robert Hore, there is in this case something in a name.

Names, however, are by no means to be relied upon unless supported by other evidence, and there is great difficulty in definitely locating many of the places mentioned in the early chronicles.

A spot might receive several names from several different parties, or, as in the present instance, several places might be christened alike. Again, it has frequently happened in Newfoundland that French and Portuguese names have been so altered by the English colonists as to be quite unrecognizable. Thus Cape Race of to-day was originally Cappa Razza, the flat cape; Cappa Speranza hides its identity under the commonplace name of Cape Spear, and Bai d' Espoir is hopelessly lost as Bay Despair.

However abundant the Great Auk may have been elsewhere, Funk Island seems to have been its chief breeding place, and here it doubt-

* The name Penguin was *first* applied to the Great Auk; its application to members of the *Spheniscidæ* came afterwards.

The name Apponath, according to Cartier, was applied by the natives to a species of bird, supposably the Great Auk, that he found in great abundance at the Island of Birds (Funk Island).

These natives were very likely the Beothucs, although, making due allowance for the twists a word receives in being adopted into a new language, the term Apponath may have come from the Eskimo word *agpa*, an Auk.

The Eskimo for the Great Auk was *isarokitsok*, he that has little wings; for little auk, *agparak*.

less lingered long after it had become extirpated in other and more accessible localities. Lying 32 miles out in the Atlantic, environed by rocks and shoals, where the sea breaks heavily during storms, the vicinity of Funk Island is by no means attractive to the modern navigator, and of late years has been seldom visited except by sealers, parties of eggers, and occasional fishermen.

The sailors of old and the hardy colonists seem to have habitually resorted to this spot for supplies, partly because there were no charts to warn them of hidden perils, and partly for the reason that supplies must be had at any risk.*

Therefore the work of slaying the Great Auks went steadily on until the last of the species had disappeared from the face of the earth, and the place to which it resorted for untold ages knew it no more.

With few exceptions naturalists seem not to have been aware of the fact that the Great Auk was being exterminated until the catastrophe had actually taken place, and fewer still appear to have thought of the calamity as occurring in America as well as in Europe.

Audubon, who, by the way, wrote of the bird at second hand, says in his work (published between 1839 and 1844) that the Great Auk is rare or accidental on the coast of Newfoundland, and is said by fishermen, who kill the young for bait, to breed on a rock off the southeast coast of that island.

This speaks of the bird as rare, giving no hint that it was then looked upon as extinct, but in the "Gloucester Telegraph" for August 7, 1839, is an article from the "Salem Register" signed "A Fisherman," in which the Great Auk is spoken of as being already exterminated.

This paragraph which is interesting in that it adds one more cause for the extermination of the bird to those already known, is as follows :

All the mackerel-men who arrive report the scarcity of this fish, and at the same time I notice an improvement in taking them with nets at Cape Cod and other places.

If this speculation is to go on without being checked or regulated by the Government, will not these fish be as scarce on the coast as penguins are, which were so plenty before the Revolutionary War that our fishermen could take them with their gaffs? But during the war some mercenary and cruel individuals used to visit the islands on the eastern coast where were the haunts of these birds for breeding, and take them for the sake of the fat, which they procured and then let the birds go.†

This proceeding destroyed the whole race.

The Rev. William Wilson, who resided in Newfoundland as a missionary from 1820 to 1834, and who once preached a sermon against the

* The writer has no intention of picturing the difficulty of landing on Funk Island in too dark colors. It is simply a question of striking a favorable time, and while the dweller on the coast can choose his time, the chance visitor must trust to luck, and luck is ever an uncertain element. At the time of our visit landing on "The Bench" was a simple matter, although at any other point a boat would have been dashed to pieces in the surf; a little later another collector lost a fortnight in trying to land, and then gave it up.

† Of late years the penguins of the Antarctic Seas have been killed by sealers and tried out for oil.

wanton slaughter of the bird,* wrote of the Great Auk in 1864 that "Half a century ago the penguin was very plenty. * * * The penguin is now but seldom seen; such destruction of the bird was made for the sake of its feathers that it is now all but extinct.†

The exact derivation of the word penguin and the date at which it came into use is uncertain, although it occurs in the "Voyage of M. Hore and divers other gentlemen to Newfoundland and Cape Breton in the yeere 1536." Professor Newton (than whom there can be no better authority) considers it probable that penguin is derived from *pinwing*, a name still somewhat used in Newfoundland, and that this term was bestowed on the Great Auk by the English fishermen from the fact that the bird was as flightless as if pinwinged, in more modern parlance pinioned. This operation consists in bending down the outer joint of the wing, as in plucked chickens, or in locking the wings together across the back.

Professor Steenstrup, on the other hand, believes the word to be of Welch origin, from *pen*, white, and *gwin*, head; and although the head of Great Auk is not white, yet there is a large white spot just in front of the eye of sufficient size to warrant the appellation.

The French *pingouin* is of later date than penguin and was probably derived from the English word, and though the supposition that both came from the Spanish *pingue*, fat, meets with no favor from either Professor Newton or Professor Steenstrup, it is after all not without some slight show of reason.

The fishermen of Normandy, Brittany, and the Basque provinces were the earliest to resort to Newfoundland, and these were on the ground as early as 1504, only seven years after the discovery of the island by Cabot. In 1517 there were forty Portuguese, French, and Spanish vessels engaged in the cod fishery; and in 1578, according to Hakluyt, three hundred and fifty Spanish and French vessels and only fifty English.

Thus it would appear that there was some chance of the Great Auk having received its original name from the Spanish or French fishermen although the English-speaking race has ever possessed the happy faculty of forcing its language upon all with whom it comes in contact.

That the Great Auk was well known at an early date is shown by Anthonie Parkhurst's statement, written in 1578, that "the Frenchmen who fish neere the grand baie,‡ doe bring small store of flesh with them, but victuall themselves with these birds" (penguins).

The extermination of the Great Auk took place so suddenly that a comparatively small number of skins, skeletons, and eggs were preserved in museums, and in America, where the garefowl had been most abundant, scarce a specimen existed.

*Given on the authority of Mr. George A. Boardman.

†Newfoundland and its missionaries, by Rev. William Wilson. Cambridge, 1866.

‡Probably the Gulf of St. Lawrence, as our own fishermen still speak of this as "The Bay."

The U. S. National Museum possessed a stuffed specimen and an egg, but in going over the osteological collection a single humerus of the Great Auk was all that could be found, and even this was from a New England shell heap. In the spring of 1885 the writer suggested the great desirability of securing, if possible, other bones of this extinct bird, which could doubtless be found on Funk Island, where Professor Milne had secured a number during a brief visit in 1874. This suggestion met with the approval of Professor Baird, but some correspondence with the Rev. M. Harvey, of St. John's, Newfoundland, made evident the fact that in order to insure the success of an expedition to Funk Island some naturalist should accompany the party, and that such a trip would entail the expenditure of considerable time and money.

So the matter rested until the year of 1887, when it became apparent that the work of the U. S. Fish Commission would make it desirable for the schooner *Grampus* to visit the coast of Newfoundland and Labrador, and the question of visiting Funk Island was referred to Captain Collins.

The undertaking met with the approval of Captain Collins, who by indorsing the enterprise at the outset, and by cordial co-operation throughout the resulting trip, ensured the complete success of the expedition.

It was my good fortune to be detailed to accompany the *Grampus*, primarily to collect remains of the Great Auk, and also to secure as much other anatomical material as might be obtainable.

As the proposed route would take the vessel to some localities where little collecting had been done, Mr. William Palmer was also detailed for the trip. He devoted himself especially to the birds and his interesting observations appear elsewhere.

A more harmonious party probably never cruised together, and to this, and to the fact that the rig and equipment of the *Grampus* fitted her perfectly for the work in hand, may be attributed the success of the voyage.

The middle of June was the date set for sailing, but owing to circumstances the *Grampus* did not leave Gloucester until July 2, a delay, however, that proved to be for the best, as the summer of 1887 was unusually backward in the Gulf of St. Lawrence.

The Bird Rocks of the Gulf of St. Lawrence was the first place set down for a visit, but as wind and sea were then too high for landing July 8 was passed at Grindstone Island, of the Magdalen group, where a few birds were collected.

The only mammal seen was a young seal (*Phoca vitulina*), and it is difficult to realize that the Magdalen Islands were once the seat of a flourishing walrus fishery, and that thousands of these huge beasts were annually slaughtered along their barren shores.

Molineux Shuldham, writing in 1775, speaks of the walrus as being found on the Magdalens, St. John's Island, and Anticosti, and the

animal was occasionally seen in the gulf during the first part of the present century.

A little after noon on July 9 we came to anchor off the Bird Rocks, a spot full of interest both to the naturalist and historian, for these little islets were resorted to for supplies by the old navigators, and we find them several times mentioned in Hakluyt's *Voyages*, first, so far as I am aware, by Jacques Cartier in June, 1534.

Cartier's account runs thus:

The next day being the 25 of the moneth, the weather was also stormie, darke, and windy, but yet we sailed a part of the day toward west-northwest, and in the evening wee put ourselves athwart untill the second quarter; when, as we departed, then did we by our compasse know that we were northwest by west about seven leagues and an halfe from the Cape of S. John, and as wee were about to hoise saile the wind turned into the northwest, wherefore wee went southeast about 15 leagues, and came to three ilands, two of which are as steepe and upright as any wall, so that it was not possible to climbe them, and betweene them there is a little rocke.

These ilands were as full of birds as any field or medow is of grasse, which there do make their nestes, and in the greatest of them there was a great and infinite number of those that we call Margaulx, that are white and bigger than any geesé, which were severed in one part. In the other were onely Godetz, but toward the shoare there were of those Godetz and great Apponatz like to those of that iland that we above have mentioned. We went downe to the lowest part of the least iland where we killed above a thousand of those Godetz and Apponatz. We put into our boates so many of them as we pleased, for in lesse than one houre we might have filled thirtie such boats of them.

We named them the Ilands of Margaulx.*

Charles Leigh's account of his visit in 1597 is as follows:

The 14 (of June) we came to the two Islands of Birds, some 23 leagues from Mene-go, where there were such abundance of birds as is almost incredible to report. And upon the lesse of these Islands of Birds we saw great store of morses or sea-oxen, which were a sleepe upon the rocks, but when we approached nere unto them with our boate they cast themselves into the sea and pursued us with such furie as that we were glad to flee from them. The 16 we arrived at Brian's Island, which lyeth 5 leagues west from the Island of Birds.†

And a little further on we find him telling us that—

The greatest of these islands is about a mile in compasse. The second is little lesse. The third is a very little one, like a small rocke. At the second of these three lay on the shore in the sunshine about thirty or forty sea-oxen or morses, which, when our boat came nere them, presently made into the sea, and swam after the boat.‡

That Cartier's "Isles des Margaulx" are the Bird Rocks of to-day seems unquestionable, although no locality at all can be found by following the courses and distances given as having been sailed on June 24 and 25, 1534.

But by following Cartier northward from Buena Vista, through the Strait of Belle Isle, and thence southward, we learn from the latitudes

* Hakluyt's "Collection of Voyages." London, 1600, Vol. III, p. 205.

† Hakluyt, Vol. III, p. 242.

‡ Hakluyt, Vol. III, p. 249. This has the appearance of being a revision of the first account, written either much later or by a better scholar than the writer of the description on p. 242.

now and then given that on June 25 he must have been somewhere in the vicinity of the Bird Rocks.

It is also difficult to resist the temptation of suggesting that there has been a mistake in translating Cartier's log, and that "15 leagues southeast" should be 15 leagues southwest. This is certainly a somewhat radical change, but the difference between *sudest* and *sudouest* is not very great to the eye, and the translator might easily have gone astray there.

Moreover why Cartier should have run dead before the wind to the eastward when he seems to have been trying to work to the westward, and could have held his own simply by keeping the wind abeam, is rather strange.

Finally, if he was seven and a half leagues northwest by west from some point on the west coast of Newfoundland, a run of 15 leagues southeast would have carried him plump ashore, owing to the great amount of westerly variation.

In this connection I desire to express my indebtedness to the courtesy of Commander J. R. Bartlett, Chief of the Hydrographic Office, and to Mr. G. W. Littlehales, of the Division of Chart Construction, for very kindly supplying me with the necessary data for solving this problem.

Fortunately, too, there is a reference to the island of Brion, giving its distance and direction from the Iles des Margaulx, and this is alone sufficient to identify the spot, as they harmonize with existing facts.

Brion Island, like Blanc Sablon and Chateau Bay (the Bay of Castles in Hakluyt), has luckily retained its name unchanged, while so many other places have either been re-named or had their original appellations anglicized out of existence.

Further confirmation is found in the Margaulx themselves, these birds, "which bite even as dogs," being gannets, whose descendants, in spite of centuries of persecution, may still be found breeding where their ancestors did before them. Ordinarily the presence or absence of any given species of bird might seem of small value as a factor in the identification of a locality, but the gannet is extremely critical in the choice of a breeding place, and extremely pertinacious in clinging to it when once selected.

Once established, nothing short of complete destruction appears to drive them away, and unless carefully protected this curiously conservative spirit will eventually result in extermination.

Thus, while there are many points along the coast from Maine to Labrador where the Gannets might breed, they are found, so far as I have been able to ascertain, only at three places, an island in the Bay of Fundy, the Bird Rocks and Bonaventure Island at Percé, Canada, the colony at Mingan being too small and too nearly exterminated to be taken into consideration.*

* Dr. Stejneger tells me that the same thing occurs in Europe, where the Gannets cross the North Sea to breed on the Scottish coast, although there are numerous favorable localities on the coast of Norway.

That Cartier's description of the islands does not quite accord with their present appearance is not to be wondered at.

The material of which they are composed is a soft, decomposing red sandstone that succumbs so easily to the incessant attacks of the sea that Dr. Bryant's description of them in 1860 does not hold good to-day. If, then, the Bird Rocks have undergone visible changes in twenty-five years, it is easy to imagine how great are the alterations they may have undergone during three and a half centuries.

Dr. Bryant, in 1861, wrote as follows:*

These (the Bird Rocks) are two in number, called the Great Bird or Gannet Rock, and the Little or North Bird; they are about three-quarters of a mile apart, the water between them very shoal, showing that, at no very distant epoch, they formed a single island. * * * The North Bird is much the smallest and though the base is more accessible, the summit can not, I believe, be reached; at least I was unable to do so; it is the most irregular in its outline, presenting many enormous, detached fragments, and is divided in one place into two separate islands at high water, the northerly one several times higher than broad, so as to present the appearance of a huge rocky pillar.

Gannet Rock is a quarter of a mile in its longest diameter from SW. to NE. The highest point of the rock is at the northerly end, where, according to the chart, it is 140 feet high, and from which it gradually slopes to the southerly end, where it is from 80 to 100.

The sides are nearly vertical, the summit in many places overhanging. There are two beaches at its base on the southerly and westerly sides, the most westerly one comparatively smooth and composed of rounded stones.

The easterly one, on the contrary, is very rough and covered by irregular blocks, many of large size and still angular, showing that they have but recently fallen from the cliffs above.

This beach is very difficult to land on, but the other presents no great difficulty in ordinary weather; the top of the rock can not, however, be reached from either of them. The only spot from which at present the ascent can be made is the rocky point between the two beaches.

It was on this point, by the way, that Audubon's son landed June 14, 1833.

The Great Rock has apparently altered but little during the past twenty-five years, but such changes as have taken place have tended to improve the character of the southerly beach, which has been selected by the keeper of the light-house for the customary landing place. Two long ladders, bolted to the rock and leading to the summit have been erected.

The westerly beach is, however, the most accessible, and it is here that the heavy light-house supplies are landed, a large hoisting apparatus having been placed at the top of the overhanging cliff.

If the Great Rock is but little changed, its lesser relative has suffered greatly, sea and frost, rain and ice having wrought sad havoc with it, splitting great fragments from the sides so that a landing once effected it is now an easy matter to reach the top.

* Remarks on some birds that breed in the Gulf of St. Lawrence, by Henry Bryant M. D. Proc. Bos. Soc. Nat. Hist., Vol. VIII, 1861-'62, pp. 65-75.

Landing can hardly be called easy in any but the finest of weather, but on the afternoon of our visit we were favored with a calm, and succeeded in beaching our boat on the southerly side without difficulty, possibly on the same spot where nearly three centuries before Charles Leigh found a herd of huge walruses basking in the sun.

The Little Rock is about 75 yards long and perhaps 50 feet in height. It is divided into two portions by a wide cleft, that seems from the condition of the fallen rocks to be of comparatively recent origin, and it is only a question of time when there shall be two islets instead of one.

Twenty-five yards from the eastern point lies the little rocky pillar mentioned by Dr. Bryant, but this is now separated from the Little Rock even at low tide, although if one does not mind cold water and slippery rocks, it is then an easy matter to wade across the connecting ledge.

About midway between the Great and Little Rocks is a shoal which may possibly mark the site of the little rock mentioned by Cartier, although the islet, that for lack of a name may be called the Pillar, agrees sufficiently well with the description.

It has been considered probable that the Great Auk once bred here, and that this was the bird Cartier calls the Great Apponatz. True, a few may have strayed here from the colony at Penguin Island, off Cape la Hune,* but this, from the clannish habits of the bird, seems doubtful. Besides the area available for breeding purposes is limited to a narrow strip on the northeastern point, and a still more restricted portion on the southern side, these being the only places accessible to a flightless bird like the Garefowl.

Mr. Grieve suggests in a recent letter that in former times the space at the base of the Little Rock was much more extended than at present, since Cartier's crew "killed above a thousand of these Godetz and Apponatz" "on the lowest part of the least island."

This supposition may well be correct, yet careful observation of the rock and the depth of water immediately about it leads to the conclusion that the changes it may have undergone have been the result of the fall of fragments from the overhanging sides rather than the wearing away of the base.

Charles Leigh makes no mention of Penguins at the time of his visit in 1597, although it seems probable that he would have done so had they been there.

On the other hand, the Bird Rocks agree in location with the "Island of Penguin," mentioned by Silvestre Wyet, shipmaster of Bristol, in 1594, "which lyeth south from the easternmost part of Naticoteci (Anticosti) some twelve leagues. From the island of Penguin we shaped our course for Cape de Rey and had sight of the Island of Cape Briton."

*The presence of the Great Auk at the Cape la Hune, Penguin Islands, is very largely presumptive, positive evidence to that effect being lacking.

They may be the islands mentioned by M. Hore, or they may not.

If the Godetz and Appouatz were Murres and Razor-bills it would have required but a comparatively small extent of cliff for their accommodation, for at this early date every available inch of room must have been occupied.

The top of the Little Rock was covered with a thin deposit of guano, marked with many shallow, saucer-like depressions where the Gannets had made their nests, but not a single egg of this species was to be seen, and the few eggs of the Murre and Razor-bill that were subsequently found had evidently been overlooked by the fishermen who resort to this rock for supplies, and who had made a clean sweep of everything within reach.

A few Kittywakes had literally reared their young on the southern side, and under the overhanging cliff on the northwest a small number of Murres, Razor-bills, and Puffins were breeding.

Careful search brought to light a few eggs and nestlings, some of these latter so carefully concealed among the bowlders that but for their incessant peeping they would have been passed by.

The top of the pillar was closely packed with breeding Gannets, while a few were sprinkled along the sides. As this rock is somewhat difficult of access these birds, together with a small colony of Murres and Razor-bills, probably succeeded in raising their young. From this spot three young Gannets were obtained, these being the first of the season, according to Mr. Turbid, the light-keeper, who most kindly gave us all the aid and information in his power.

The Great Rock is the real breeding place of the birds, Gannets, Murres, Puffins, and Razor-bills being both abundant and tame, in spite of the fact that they are subjected to continual persecution. The birds do not seem to be divided into colonies according to species, Gannets and Murres being found in juxtaposition, and although the Gannets prefer the upper ledges, yet their distribution is to a great extent regulated by the width of the rocky shelves, the Murres taking possession where there is not sufficient room to accommodate their larger companions. There is, however, a tendency of birds of a feather to flock together in little groups of a dozen or two, and at a distance the cliffs appear seamed with white, owing to the long lines of perching Gannets.

The top of the Great Rock is now entirely deserted by all birds except the little Leach's Petrels, who burrow in security among the fragments of stone that everywhere show through the shallow soil.

It is evident from the accounts of previous visitors that the interesting colony at the Bird Rocks has become sadly diminished in numbers. At the time of Cartier's visit, every inch of available space seems to have been occupied by breeding birds, and in 1597 Charles Leigh said "the three islands of birds are sandy red, but with the multitude of birds upon them they looke white. The birds sit there as thicke as stones lie in a paved street."

At the time of Audubon's visit in 1833 he compared the effect of the birds, seen from a distance hovering over the summit, to a heavy fall of snow.

The Gannets were then largely used for bait by the fishermen of Bryon Island, no less than forty boats being supplied from the Bird Rocks, and Audubon relates how a party of six killed with clubs five hundred and forty birds in less than an hour.

In 1860 Dr. Bryant estimated the number of Gannets breeding on the *summit* of the Great Rock alone at 50,000 *pairs*, the total number at 75,000 pairs, although these figures are very likely too high.

In 1872, owing to the erection of the light-house, the colony on top of the rock had become reduced to 5,000, and in 1881 Mr. Wm. Brewster found that the Gannets had been entirely driven from the summit, although the Little Rock was still densely populated. He places the total Gannet population of the rocks at 50,000, which is still an extraordinary and impressive number, although much less than the figures of previous observers.

In 1887, only six years later, not a single Gannet bred on the Little Rock, although perhaps a hundred and fifty may have found nesting places on the Pillar, while according to M. Turbid not more than ten thousand dwelt on the ledges of the Great Rock.

Besides the Bird Rocks the only large colony of Gannets in the Gulf of St. Lawrence is at Bonaventure Island, on the Canadian coast, where, on the lofty and vertical cliffs of the eastern side (250 feet high), these birds breed in a state of semi-security. Dr. Bryant inadvertently locates this colony at Percé, or Arch Rock, but although this curious and inaccessible islet is only a mile or so distant, and the birds breeding on its summit are perfectly safe, not a single Gannet is to be found among them.

Here, too, the number of Gannets has greatly diminished, and when later on we visited Bonaventure Captain Collins expressed surprise at the marked decrease in their numbers. That this colony ever compared in extent with that at the Bird Rock is very doubtful, although Dr. Bryant states that it is "perhaps even more remarkable."

A few Gannets were found at Perroquet Island of the Mingan group, in spite of the incessant persecution of the Indians who regularly make a clean sweep there. In 1860 Dr. Bryant predicted that the locality would soon be deserted, but in 1881 Mr. Brewster found several hundred birds still there, although shortly after his visit the Indians took every egg.

No Gannets were seen east of Mingan, and none on the eastern coast of Newfoundland, although in the time of Cartier there seems to have been a colony of these birds on Funk Island, where, if one may credit the testimony of fishermen, they were still breeding thirty years ago.

The same decrease of Gannets seems to be taking place elsewhere, and Professor Newton tells me that at Lundy Island in the Bristol Chan-

nel, the only British locality where this bird is found, there were in 1887 but a dozen pairs left.

The decrease of Gannets at the Bird Rocks is the most perceptible owing to their size, but the smaller birds have doubtless suffered in the same proportion. Scarcely a day passes during fine weather without a visit from fishermen* in search of eggs or Murres, these latter being used for food and making a not unpalatable stew.

Many barrels of eggs are gathered during the season, and altogether the birds lead rather a precarious existence. Still a large portion of the Great Rock is practically inaccessible, and unless the feather hunters afflict this interesting spot with their presence the birds may continue to breed here in diminished numbers for long years to come.

The extermination of birds is largely a question of sentiment, but these sea-fowl exist in such numbers that they play a not unimportant part in supplying food to the residents of the gulf and coast of Labrador, and hence their extirpation is to be doubly deplored.

There is a law regulating the taking of eggs, and if this were observed, or could be strictly enforced, a large number of eggs could be gathered annually while at the same time the number of birds would steadily increase. But in a region so thinly peopled as the coasts of Labrador and the gulf, game laws are difficult to enforce and each party of fishermen acts on the principle that it is useless to leave what the next visitor will be sure to take.

Mr. Turbid, however, who has resided on the Great Rock as light-keeper since 1880, states that latterly the birds are on the increase and that in the last eight years the Murres have doubled in numbers, the Gannets increased one-third, and the other birds from one quarter to one-third. Mr. Turbid also told us that the Murres were becoming used to the fog-gun, which at the time of Mr. Brewster's visit was, indirectly, a source of great destruction.

At each discharge the frightened Murres fly from the rock in clouds, nearly every setting bird taking its egg into the air between its thighs and dropping it after flying a few yards. This was repeatedly observed during our visit, and more than once a perfect shower of eggs fell into the water around our boat. So seriously had the Murres suffered from this cause that many of the ledges on the side of the rock where the gun was fired had been swept almost clear of eggs.†

It was the intention to have visited the Cape la Hune Penguin Islands, but rough weather made this impracticable, and from the Bird Rocks the *Grampus* went direct to St. John's, Newfoundland. Here we had the pleasure of meeting the Rev. M. Harvey, who most kindly gave us all the aid in his power, and here Capt. Duncan Baxter joined the vessel as Newfoundland pilot, although he also rendered most efficient aid as a collector.

* We found a party on the Little Rock at the time of our visit, and later in the day another boat's crew landed on the westerly beach of the Great Rock.

†Brewster, Proc. Bost. Soc. Nat. Hist., Vol. XXII, p. 410.

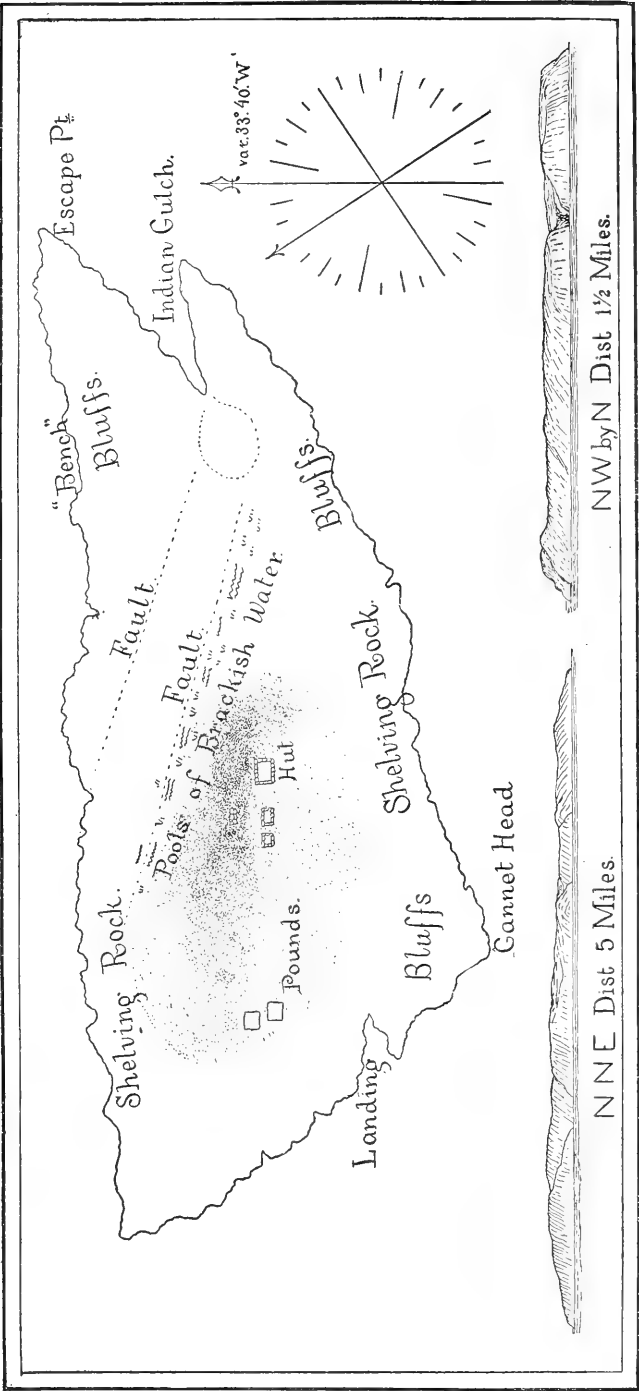
EXPLANATION OF PLATE LXXI.

SKETCH MAP OF FUNK ISLAND.

Outline from British Admiralty Chart; details by F. A. Lucas; elevations by Capt. J. W. Collins.

The shaded portion indicates the location of remains of the Great Auk; intensity of shade denoting corresponding abundance of bones.

To an observer on the island, the eastern and western points seem more rounded than given on the chart.



SKETCH MAP OF FUNK ISLAND.

During our stay at St. John's we met several fishermen who had visited Funk Island on eggging expeditions, but beyond ascertaining the position of the best landing little knowledge was gained, nothing concerning the character of the soil, or the chances for and against securing remains of the Great Auk.

Leaving St. John's on the morning of July 21, we sailed northward toward Cape Bonavista, a headland that still bears its original appellation, following almost exactly the track pursued by Cartier's vessels more than three centuries ago.

Daybreak on the morning of the 22d found us in sight of Funk Island, but the wind was so light that not until noon were we near enough for a boat to be lowered and a start made for the shore.

But two collectors had visited Funk Island before us, Peter Stuvitz in 1841 and Prof. J. W. Milne in 1874, both of whom had been compelled to cut short their stay and hasten back to their vessels on account of threatening weather. Warned by their experience, it had been decided to take ashore in the first boat a camping outfit and provisions for several days, so that in the not impossible event of a fog or fresh breeze springing up we could remain on the island and proceed with work while the *Grampus* sought safer quarters.

Accordingly the dory set out with a load large enough and varied enough to have started a small country store. Besides tent and tent poles, a huge firkin of provisions, and three breakers of water there were digging utensils of various descriptions, a gun and plenty of ammunition, buckets, baskets, rope, anchor, and a general wilderness of rubber boots, coats, and southwesters.

We were not, however, compelled to avail ourselves of these elaborate preparations, for the weather continued so fair that at night we returned to the *Grampus*, and although after sunset the wind freshened and next morning the weather looked decidedly threatening, the squalls passed over and gave place to light southerly breezes.

Viewing the island from a distance it had seemed possible with the faint air then stirring to beach a boat on the southerly slope; but closer approach transformed the narrow line of foam and gently shelving rock into the wash of a heavy swell on a steep and slippery slope of granite, whereon landing was quite out of the question.

The best landing is at a spot termed "The Bench," lying a hundred yards or so to the west of the northeastern or Escape Point, and toward this portion of the island, where from time immemorial man had landed to despoil the feathered inhabitants, we directed our course.

The Bench is a narrow path, hewn by nature in the side of a low, almost vertical cliff, leading at high tide from the water's edge to perhaps 20 feet above it.

At the widest this path is 4 feet across, but from that it tapers either way to nothing, terminating at the upper end in a fissure just wide enough to accommodate one's foot, the rough granite furnishing a very good substitute for a hand-rail.

Below "the bench" the rock descends almost vertically to a depth of 120 feet beneath the sea, this combination of deep water and smooth, perpendicular rock offering no obstacle to chafe the sea into breaking, so that with southerly winds, as at the time of our visit, the swell merely rises and falls along the wall of rock.

With northerly winds this landing of course is impracticable, and boats then seek a more precarious spot near Gannet Head, on the southwest, where Stuvitz seems to have landed in 1841.

Once on "the bench" it is an easy matter to reach the summit of the island, either by scrambling directly up the face of the rock or by an easier but more circuitous path, if path it can be called, leading from the fissure in which "the bench" ends.

While the height of Funk Island is put down on the chart at 46 feet, it certainly looks to be much higher, whether seen from the deck of a vessel or viewed from the eastern bluffs.

The entire eastern end of the island is very precipitous, as is also the southwestern extremity, but on the northwest and along a lesser portion of the southern side the rock slopes gradually into the sea, and it was here that the Great Auk scrambled through the breakers to meet its fate.

The greatest length of the island from east-northeast to west-southwest is about half a mile, its breadth a quarter, these distances being set down in the sailing directions as 800 and 400 yards.

Lying respectively 600 and 1,200 yards off the western point are two small, rounded islets, so low that they must be completely washed over in rough weather, and consequently untenable as breeding places.

Two faults, deepened by time into shallow valleys, divide the island into three ridges running nearly east and west. The northern and central of these are bare rock, for the most part smoothed and rounded by rain and ice, although here and there the decomposition of the feldspar has formed curious, overhanging ledges, especially toward the eastern end.

In these depressions are numerous pools of brackish water, the more extensive—interspersed with patches that may be dignified by the name of marsh—lying along the line of the southernmost fault, which terminates in a small, natural amphitheater, floored with pebbles.

Growing amidst these pebbles were patches of a blue-flowering weed, around which white butterflies (*Pieris*) were sufficiently numerous to indicate that they were regular inhabitants of the island.

Indian Gulch, the eastern termination of the northern fault, opens into this amphitheater from the sea by a narrow cleft, into which the swell rushes in a seething torrent of foam, emphasizing the remark of the sailing directions that "at all times the scend of the sea would make it unsafe for a boat in such narrow waters."

A large portion of the southern and most extensive swell of rock is

thickly covered with vegetation*, this, the former breeding ground of the Great Auk, being mapped out in vivid green by the plants nourished by the decomposed bodies and slowly decomposing bones of the long extinct bird.

It would seem that the Auk inhabited every accessible foot of ground, the inability of the bird to fly restricting it of necessity to such portions of the island as could be reached after a landing had been effected on the northerly or southerly slope.

Any abrupt rise of smooth rock, although comparatively low, would interpose an insurmountable barrier to further progress, and from the character of the rock and total absence of bones, it does not seem that the Auk ever passed beyond the southernmost line of fault, or even reached the eastern part of the island.

Here the Auk bred in peace for ages, undisturbed by man† until that fateful day in June, 1534, when Cartier's crews inaugurated the slaughter that terminated only with the existence of the Great Auk.

Here to day the bones of myriads of Garefowl lie buried in the shallow soil formed above their moldered bodies, and here, in this vast Alciné cemetery, are thickly scattered slabs of weathered granite, like so many crumbling tombstones marking the resting places of the departed Auks.

It is rather curious that these blocks of stone should be found on this part of the island, just where they would be most needed by man, but for some reason the rock seems to weather into slabs more on the southern rise than elsewhere. It is also an interesting coincidence, to say the least, that Robert Hore and another of the old navigators speak of Penguin Island as "very full of rocks and stones," although their accounts seem to refer to Cape la Hune, Penguin Islands, rather than to Funk Island.

* The following plants have been recorded from Funk Island.

* *Poa annua* L. Common in wet places.

* *Glyceria maritima* Wahl. Common in wet places.

* *Senecia vulgaris* L. Common in wet places.

† *Plantago maritima*. Along ponds.

* *Ranunculus hyperboreus* Rotlb.

* *Stellaria media*.

* *Cochlearia officinalis* L. Among pebbles at head of Indian Gulch.

† *Cochlearia fenestrata*.

* *Cælopleurum gmelini* Led.

† *Haloscias scoticum*.

† *Rumex*.

* *Chenopodium album* ?

* *Bynum knowltoni* ; sp. nov.

Those preceded by an asterisk (*) were collected by Mr. William Palmer, and those preceded by the dagger (†) were noted by Professor Milne.

It is a little curious that but a single species was observed by both naturalists, the more that Professor Milne was on the island but half an hour and Mr. Palmer parts of two days.

† A paddle and remains of canoes are said to have been found here, as well as stone arrow heads, and this would indicate visits from the Indians. Professor Milne considers this doubtful, owing to the indifferent-seagoing qualities of the Beothuc canoes. There seems, too, no reason why they should incur the risk of visiting this island so far at sea when plenty of sea fowl could be obtained nearer home. Still, if the remains actually were found, they could scarcely have come here by accident.

On the summit of the island, and not far from the center, are the ruins of a stone hut, built of the abundant slabs, and visible for a considerable distance. This hut is said by Professor Milne to have been the residence of the party who resided on the island for a short time in 1863 for the purpose of procuring guano. But according to another account it was built for the accommodation of a sealing crew who, some years ago, was placed on the island to pass the winter and obtain the first chance at the seals who come down on the floe-ice in the spring. The entire crew, with the exception of the cook, were lost while out sealing, and the sole survivor rescued in an almost insane condition.

The strongest point in favor of the more poetic version is found in the fact that the guano party were on the island but a few days in summer, and they would scarcely have taken the trouble to build so substantial a dwelling.

In 1863* Mr. Thomas N. Molloy, now United States consul at St. John's, fitted out the expedition to seek for guano at Funk Island, Captains Burke and Glyndon being at the head of the enterprise. They landed on the island, taking with them a large skiff, while their schooner returned to the harbor of Seldom Come By, Fogo Island.

In all 35 tons of guano were secured, four laborers obtaining 20 tons in ten days. Five tons were sold at auction in St. John's for \$19 per ton and the remainder consigned to a Boston house, by whom it was in turn sent to Baltimore and Washington.

Just where the guano came from it is difficult to say, for there is now no trace of it on Funk Island, except in the shape of a strong smell on the bare rocks of the eastern part, resorted to by Murres and Razor-bills.

The climate is not favorable to the formation of guano deposits, such as are found in dry tropical regions, and on Funk Island the rain must long ago have washed out the soluble constituents of the old "soil" of that part of the island formerly inhabited by the Great Auk.

The soil consists of two distinct layers, the lower portion, formed during the occupancy of the Auk, being from 3 inches to 1 foot in thickness and consisting largely of fragments of egg shells, although next to bed rock are numerous angular pebbles of various sizes.

The black dust from the decayed, overlying vegetation and abundant patches of charcoal has filtered into the lower stratum, but so numerous are the fragments of egg-shells that the deposit has a yellowish gray color.

The upper layer of soil, also from 3 inches to 1 foot thick, has formed since the extermination of the Auk, principally by the growth and decay of vegetation nourished by their bodies.

In fact it is possible, from the character of the plant growth above, to tell something of the probable abundance of Auk remains below; thickness of the one indicating corresponding plenty of the other.

* Mr. Molloy gave the date as 1866, but as the "mummies" were certainly obtained in 1863, this may have been a slip of the pen.

So little could be ascertained regarding the soil of Funk Island, that we came provided even with a pickaxe, while we were told that we might be compelled to dig through several feet of turf in order to reach the bones of the Garefowl. The most thoroughly useful tools proved to be two clam hoes, with which rapid progress could be made through the matted roots and scanty soil.

Peter Stuvitz, who visited Funk Island in 1844, wrote that—

On the southwestern side a little vegetation is found and sufficient soil to support an extremely scanty flora; but it is there that I discovered remains of bones in great number, and it is probable that the thin layer of vegetable mould which is met with in that locality is due to the destruction of the animals to which they belonged.

The skeletons lie in a compact mass in the earth, and according to the depth at which they are found one can estimate the time necessary for the formation of the layer of mold above them. Moreover, this layer of earth was usually very thin, and in places the bones were not covered at all.

During the last forty or fifty years the thickness of the layer of earth formed is consequently not appreciable, for a slaughter of these birds sufficiently extensive for the accumulation of such heaps of bones must antedate that epoch.

On this side are found the stone inclosures called pounds, in which the hunters concealed themselves to slay the birds.*

This description is very accurate and is as true to-day as when it was written, except that the layer of soil is thicker, and vegetation more abundant. Two of the pounds near the western landing place, whose position is indicated on the accompanying map, still remain untouched, and although the stones lie prostrate, not one is wanting. Remains of other pounds, more or less overgrown by weeds, are to be seen here and there along the central ridge of the island, and hard by the ruins of the hut recently mentioned are the traces of two other small structures partly hidden by the vegetation.

Concerning these there seems to be no tradition, but it is not at all improbable that they were the dwellings of the old-time destroyers of the Auk, for there is no reason why parties should not have passed the entire breeding season on the island in order to prosecute their work without interruption, and Cartwright says that this was done.

By placing the huts along the crest of the island they would be free from surface drainage during rains, while the "compounds" would naturally be located near the huts for convenience, and away from the water to avoid unnecessary fright to the landing birds.

The most abundant deposits of bones are found in the vicinity of the ruined hut, partially in the upper stratum of soil, where the bones of thousands of birds are mixed together in inextricable confusion.

In the upper layer of soil, too, lie the patches of charcoal and charred fragments of bones, showing where the kettles once swung in which the birds were parboiled to render plucking them an easy operation.

Tradition says that the bodies of the Great Auks were so fat that

* This is undoubtedly an error, for all other accounts agree in stating that the pounds were used for confining the birds until they should be needed.

they could be used for fuel, and while this seems a little doubtful it may yet be true, or partially so.

It certainly would have been a great convenience to the Auk exterminators to be thus relieved of the difficulty of bringing fire-wood from the mainland, more than 30 miles distant.

Close by the two best preserved pounds we upturned the sod over a circle 10 or 12 feet in diameter, beneath which was a compact layer of charcoal and bones, while not far away another excavation told as plainly as words that here was one of the last abiding places of the Auk.

Barely 2 inches of turf covered the shallow soil in which lay embedded a few fresh-looking bones of the Great Auk, mixed with others of its lesser relative, the Murre. Evidently at the time of this deposit the Great Auk was on the wane and its numbers were no longer sufficient to meet the demands of the feather hunters, who promptly supplied the deficiency with those of the bird most easily secured.

The Great Auk, by the way, is not the only bird which has been extirpated on Funk Island, for the Gannet lives in name alone, although Cartier found it abundant, and men still living remember to have seen the bird. Thanks to the efforts of the egggers, the numbers of birds of all species, with the possible exception of the Puffins, have been greatly lessened during the past twenty-five years.

Stuvitz in 1844 called Funk Island "a mountain of birds," and was above all surprised at the abundance of the Arctic and Common Tern, while in 1874 Professor Milne wrote that "although it was the 20th of July, we were almost everywhere in danger of placing our feet upon eggs."

We found the Arctic Terns still very numerous, and the shrill cries of the large flock that circled round our heads were so loud and incessant as to be positively annoying.

Their young, and eggs in an advanced stage of incubation were scattered here and there from one end of the island to the other, but not a single specimen of the Common Tern was noticed.

The number of Murres and Razor-bills was comparatively insignificant, and the few eggs of these species that were seen were placed in the most secluded spots attainable.

The Razor-bill in particular seems to be learning wisdom by bitter experience, and, as we first noticed at the Bird Rocks, hides its egg whenever practicable in some nook or cranny, or under an overhanging ledge where it will be safe from all intruders.

The Puffins, however, who find security in their burrows, exist in great numbers, and to them, at least, the extermination of the Great Auk has proved a decided advantage by providing soil in which to dig their habitations.

The entrance to each burrow is surrounded by small collections of Great Auk bones which these little resurrectionists have brought to

light, and the intermingled condition of the buried remains is in no small degree due to the labors of the busy Puffins.

During the day, perching upon the ruins of the hut, or standing on the blocks of granite, they watched our labors with mingled interest and suspicion, while towards sunset, returning from distant fishing expeditions they gathered along the bluffs in battalions, flanked by companies of Murres and Razor-bills.

The Puffins were the first to assure us of the success of the expedition, for the many specimens of the unmistakable humerus of the Great Auk contained in their little osteological collections were certain evidence of the quantities of bones that lay beneath the soil. The *modus operandi* in digging was to skim off the superficial layer of turf and with a few strokes of the hoe bring up some samples of bones. If, on inspection, the quality of the bones was found to be good, careful excavation with hoe and fingers followed, but if, as often happened, the exhumed bones were brown and weatherworn, another spot was tried at once.

Quantity was a secondary consideration, for where the remains were most abundant they were usually in a poor state of preservation, the more scattered specimens being the best.

On the northerly slope a stroke of the hoe made anywhere would bring to light at least a score of bones, but on the west, and more especially on the south, the deposits rapidly thinned out, although no spot was tried where Auk bones were not found, and it is no exaggeration to say that millions of Garefowl gave up their lives on these few acres of barren rock.

Professor Milne seems to have had some doubt of all the bones he discovered being those of the Great Auk, for he remarks: "at nearly every trial bones were found, but there was nothing that could be identified as ever having belonged to the bird for which I searched."

For the benefit of future visitors to Funk Island it may be said that bones, other than those of the Great Auk, are of very rare occurrence, so much so that two barrels of earth and bones, gathered haphazard, contained less than a handful belonging to any other bird.

Contrary to what might be supposed the more recent bones are in the worst state of preservation, for owing to their protection from the sun and the fact that they are kept damp for the greater part of the time, those found in the lower stratum of soil are in much better condition than those nearer the surface.

The majority of the bones are weather-worn, others are stained but perfect, while now and then a bone may be found looking as fresh and white as if the bird to which it belonged had been killed but a year or so ago.

Some of the best preserved bones lay at the entrance of Puffin burrows and had evidently been brought to light in the course of their spring house-cleaning, but it proved a futile task to follow the course of the hole in the hope of finding others equally good.

The skull usually breaks across at the articulation of the nasals with the frontals and many a time did we work carefully around the point of some projecting beak only to find that the back of the skull was entirely lacking. The sternum and pelvis are very rarely found in good condition, the thinness of these bones, and their immediate contact with the viscera having caused their rapid decay so that although we disinterred hundreds we succeeded in obtaining but a single perfect specimen of each.

It would seem that these alpine remains are rapidly deteriorating, although so few visits have been made to Funk Island with the view of procuring bones that it is difficult to make comparisons, while at the same time the element of luck must, to a large extent, enter into the finding of buried bones.

In 1863 three "mummies," or dried bodies of Great Auks, were secured by the party in search of guano, and in 1874 Professor Milne obtained in half an hour bones representing fifty individuals, from which four more or less complete skeletons were constructed.

In 1887 our party passed portions of two busy days in exhuming thousands of bones, and yet this great number will "make up" not more than a dozen skeletons, and these not absolutely perfect, while no entire specimen was found, although in the hope of coming upon a "mummy", holes were dug in many places quite to the bed rock. Neither did we secure more than a single membranous lining of the egg of the Great Auk, although Professor Milne in less than half an hour found "the inner linings of a few eggs."

The mixed condition of the remains has already been alluded to, and so completely are the bones intermingled, that after many endeavors to obtain those of a single individual, the attempt was abandoned in despair, heads and feet, sterna and pelves being intimately associated with one another, and not more than six, or at the most eight, consecutive vertebræ being found together.

An idea of the great abundance of bones may be gathered from the fact that while many humeri were thrown aside while digging the collection was found to contain over fourteen hundred specimens of this bone.

Every part of the skeleton was secured, including even the small ethmo turbinals, although in spite of careful search but one or two of the first rib and third phalanx of the wing were found.

The number of bones from young birds is extremely small, but this all but total lack of them is readily accounted for by the fact that after the merciless slaughter of the Auks had fairly commenced, few, if any, eggs were allowed to hatch.

There was a small number of diseased bones present, the result of injuries, and one of these, a broken and re-united ulna, had apparently been shattered by a shot. Comparatively few of the crania show any evidence of their original owner having met with a violent death, but

this is largely due to the selection of the best specimens that offered; any that were obviously poor being passed by.

Professor Milne remarks that "the fact that there remains no evidence of cuts or blows leads to the supposition that these birds may have died peacefully" but some of the crania *do* show the marks of cuts and blows, and, moreover, there is plenty of local history or tradition to show exactly how these birds were done to the death.

It should also be borne in mind that birds seldom die peacefully, for nature rarely accords this boon to her subjects, and when they do meet their end, they seem to have a habit of making away with their skeletons: it would be more accurate to say have their skeletons made away with, for dead birds do not often go to waste, but usually find their way into the stomach of some hungry animal, possibly of the same race.

Dr. Stejneger tells me that during his stay at the Commander Islands many sea birds were washed ashore during or after gales, but unless one was on the beach before daylight the bodies were destroyed by foxes. Even in the immense guano deposits of the Chincha Islands, where every circumstance is favorable to the preservation of inhumed specimens, bird remains are of comparatively rare occurrence, while in localities where the climate is subject to extremes of heat and cold, rain and sunshine, they go to pieces rapidly.

It was not without regret that we prepared to leave so interesting a spot as Funk Island, but having successfully accomplished our mission of collecting bones of the Great Auk, no good reason remained for a longer stay when many miles of our proposed route yet remained to be traversed. Accordingly we gathered up our various impedimenta, the boat was brought alongside "the bench" for the last time, and laden with the spoils of our two days' labor we returned to the *Grampus*, which lay at anchor a mile to the eastward of Escape Point.

Fortune continued to smile on us, and as the threatening weather of the morning had given way to calm, so now that we were ready to leave a fair breeze sprang up that carried us rapidly toward the mainland.

Funk Island grew lower and lower in the distance, and as the sun was nearing the western horizon we bade the home of the Great Auk a long farewell.

It was the intention to visit, if possible, any localities whose names indicated that the Great Auk might once have been found there, especially Penguin Islands on the south coast, and Penguin Islands near Cape Freels. A brisk southwester drove us by the former place at a very lively pace, while with the visit to Funk Island still in prospect, it was not deemed advisable to lose any time in waiting for the wind and sea to go down, so this portion of the trip was abandoned.

On the eastern coast, however, the weather was more favorable; so after leaving Funk Island, the *Grampus* ran over to the well-named harbor of Seldom Come By, and the next morning started for Penguin

Islands, which lie about 3 miles from shore and 10 miles northwest of Cape Freels.

Passing Peckford Reef, the Schoolmarm, and Scrub Rocks (nature is very liberal with rocks and reefs in this part of the world), the *Grampus* anchored at noon off two low, grassy islets, whose appearance was not at all suggestive of an Alcine breeding place. Nor did careful examination reveal any traces of former habitation by the Great Auk, and if the bird once dwelt here, he left nothing behind to indicate the fact, for not a bone, nor even a speck of eggshell could be found.

This is in marked contrast with the condition of affairs at Funk Island, where, aside from the bones that the upturned sod shows everywhere present, the soil itself, thickly sprinkled with crumbled egg shells, bears mute testimony to long years of occupancy by the Great Auk.

Still one of these islets *may* be that certain flat island where Captain Richard Whitbourne tells us men "drave the Penguins on a board into their boats by hundreds at a time," although it must be said that this and similar stories have rather an apochryphal ring to them. Certainly so easy a method of loading a boat with Garefowl, as that of putting out a gang plank and driving them aboard like sheep, was not of common occurrence at Funk Island, where the slope of the rock and wash of the sea would render such a thing impossible.

Although at the time of our visit it was remarkably calm, yet the boat rose and fell along the cliff 4 or 5 feet at every heave of the swell, while on the sloping rock, even to leeward, the sea came rolling in in a manner fit to test the seaworthiness of a Great Auk, to say nothing of a small boat.

Whoever may have been the former residents of Penguin Islands, to-day their most numerous inhabitants are field mice (*Arvicola riparia*), which, if one may judge by the abundance of their burrows, exist in almost incredible numbers, while well worn connecting paths cover the ground in places with a veritable network.

A little investigation showed that many of the deserted burrows, possibly some recent ones also, had been taken possession of by breeding petrels (*Oceanodroma leucorhoa*) which were thus saved the trouble of digging their own nesting places.

A few *Puffins* (*Fratercula arctica*) are also found on the island, but they seemed to have been no more successful than ourselves in finding bones, for none lay scattered about the entrance to their holes.

Taking into consideration the general character of the islets, the thickness of the turf that covers them, their nearness to shore and the absence of remains of the Great Auk, it seems at least doubtful if the bird ever dwelt here, although the absence of remains is, it must be said, negative evidence of but small value.

If the Great Auk once bred in this vicinity, Offer Wadham, 9 miles farther seaward, is much more likely to have been its habitat, but it may be questioned if the bird was found there in historic times.

There can be little doubt that the extent of the breeding range of the Great Auk has been as a rule much overestimated, and the writer's own belief is that, like the Gannet, the Garefowl was confined to a very few localities. This is known to have been the case in Europe, and, while the fact is more difficult to prove in regard to America, it must be borne in mind that all definite accounts of the Great Auk in the New World point to, at the most, three or four localities, although during its migrations the bird occurred along the Atlantic coast from Newfoundland to Virginia.

Had it been otherwise, and had the Great Auk, as is so often stated, bred at numerous localities along the coasts of Newfoundland and Labrador, the bird in limited numbers would probably be alive to-day.

The circumstance that the bird, with suicidal persistence, resorted to a few chosen breeding places, and that it was there found in great numbers, rendered its destruction not only possible but probable, and when the white man first set foot in America, the extinction of the Great Auk became merely a question of time.

The only thing that has kept the Gannet from sharing the fate of the Garefowl is the inaccessible nature of its nesting places, and even this may not save him much longer, while the Razor-bill and Murre, in spite of their wide range and similar choice of steep cliffs whereon to raise their young, have sadly fallen off in numbers.

This decrease is due to the fact that the eggs of these birds are taken at all seasons when they are to be had, and although the law may check the practice it can not put a stop to it, so that the sea-fowl are gradually lessening in number. Still it is scarcely probable that any of the smaller Auks will suffer the fate of their great relative whose flightlessness foreordained its extermination, and whose sole chance for safety lay in the choice of unknown or inaccessible breeding grounds.

B.—SKELETAL VARIATION OF THE GREAT AUK.

The material collected by the *Grampus* comprised 2 cubic feet of earth brought away as nearly as possible undisturbed, in order to show the bones *in situ*, a barrel of Auk remains gathered along the crest of the island, and nearly another barrel of select material, containing the best preserved bones that could be found.

The disposition so far made of this material is as follows: a perfect skeleton has been placed in the exhibition series of the U. S. National Museum, one has been presented to the Museum of Comparative Zoölogy, Cambridge, Massachusetts, and another to the American Museum of Natural History, New York.*

One specimen, sent in exchange to a well-known London dealer in natural history material, has found its way to the Museum of Science

* It is of course understood that these skeletons are "made up" from bones of various individuals.

and Art, Edinburgh, and another has been sent in exchange to the Australian Museum, Sydney, New South Wales. Two skeletons are retained for the reserve series, U. S. National Museum, and three or four less complete can still be made up from the bones remaining, while there is besides a large number of individual bones, good, bad, and indifferent, left for study.

This wealth of material has offered an unusual opportunity for the study of individual variation, and it is hoped that the following notes may be of some interest in connection with that most interesting problem.

Unfortunately the conditions under which the remains were found limited all comparisons to individual bones, the inextricably mixed state of the skeletons precluding all possibility of comparing them with one another in their entirety.

Variations are of degree or of kind, due to modifications of development or of structure, and the importance of any departure from a given type depends very largely on the answer to the question to which of these two categories does the variation belong. Moreover, in considering the variations of any one species the variations of the group to which that species belongs must be taken into consideration also, as well as the liability to modification of each and every part.

Differences of size, unless excessive, are of little value, provided the parts preserve their relative proportions, and in judging of differences in proportion the age of the individual must be taken into account. This fact was very strongly impressed upon the writer many years ago by the study of an extensive series of skulls of the Orang, representing individuals of all ages, and Mr. J. A. Allen has noted similar differences, due to age, in skulls of the spider monkey.

The examination of some considerable series of skeletons of various animals has confirmed my belief in the existence of a large amount of individual variation, while at the same time creating an equal belief that, as a rule, the difference between specific and individual variation is readily recognizable.

In the present case the amount of variation is no more than might be expected to be found in any large bird were an equal series of bones examined. The skulls in particular present a striking similarity not only in shape but in size, and of seventeen crania ten have exactly the same parietal breadth, while the largest differs from the smallest by little more than 6^{mm}, a difference that must be considered trivial when the size of the skull is taken into account. Moreover, this variation is due to two skulls, one of which is unusually large, while the other is equally small.

By far the largest skull on record is one collected by Professor Milne and now in the museum of the University of Cambridge, England. The measurements of this specimen appear in the table given farther on.

The shape of the foramen magnum and the number of perforations

in the depressions for the supraorbital glands are of no value whatever, nor is the varying outline of the region bounded by the supraorbital, temporal, and crotaphyte fossæ of much more importance, since these are all characters largely influenced by age.

Mr. G. K. Gilbert's address on special processes of research suggested that the graphic method might be employed to good advantage in showing the relative sizes and range of variation in the crania, and also in some of the other bones, as well as the correspondence in size between bones from the right and left sides.

	43	44	45	46	47	48	49	50	51
150	•					••			•
151									
152			•			•	•		•
153					••				
154									
155						•• ••			
156									
157						••			
158					•	•• ••			
159			••						
160						•• •• ••	•• ••		
161									
162						••			
163									
164									
165							•	•	

Diagram showing the length and breadth of sixteen skulls of the Great Auk. The vertical columns give the length, the horizontal columns the breadth, in millimeters. Black dots indicate parietal breadth; circles indicate frontal breadth.

The table giving the relative measurements of crania shows that, as might have been expected, the length is subject to greater positive variation than either the frontal or parietal breadth, although the comparative variation of these parts is greater than the linear variation. The table shows very clearly too that the frontal and parietal width of the greater number of crania is the same—48^{mm}, and that the frontal width is slightly in excess of the parietal.

The amount of linear variation is 15^{mm}, the frontal 7^{mm}, and the parietal 8^{mm}.

The vertebræ differ considerably among themselves in size, but for reasons already given it is impossible to determine the amount of variation in the vertebral column taken in its entirety.

The odontoid notch of the atlas presents great diversity of shape, appearing in two cases as a mere slit, while in three out of fifteen specimens ossification has bridged over the notch and converted it into a foramen so that the atlas presents very much the appearance of having belonged to one of the higher altrices.

The shape and size of the neural canal varies, but it is always wider than high. The centrum of the axis is subject to much variation in size and shape, and the various processes are equally diversified. In very rare instances the vertebral artery sends a branch upward through a minute foramen at the base of the metapophysis, but ordinarily there is only a notch present at this spot. The sixth to ninth cervicals, inclusive, have many features in common and these resemblances render it extremely difficult to distinguish them from one another when, as in the present instance, a large number are mixed together, since, for example, the sixth vertebra of a large bird is almost the exact counterpart of the seventh of a smaller specimen. In fact, but for Professor Owen's memoir on the Great Auk, the "making up" of skeletons would have been extremely difficult owing to the amount of individual variation.

The tenth cervical, however, was shown by Professor Owen's paper to have a very characteristic shape, being distinguished by a broad hypapophysis directed forward, and this furnished one point of departure for the arrangement of the vertebral column.

In the dorsal region there are differences in the development of the hypapophyses, but these seem as might be supposed, to be correlated with differences in the size and strength of individuals.

The length, strength, and curvature of dorsal and sternal ribs is of course variable, and the number of epipleural appendages seems to have been by no means constant.

It may be said that comparatively few epipleurals could be found, as these little bones are so thin that they readily decompose.

The skeleton described by Professor Owen seems to have been that of a very old bird, and epipleurals were present on the second pair of cervical ribs, this, in the light of the material in hand, being of extremely rare occurrence.

A most interesting and instructive variation is of frequent occurrence in the "sacrum" which is composed of fourteen vertebræ, the first bearing the eighth, and ordinarily the last, pair of ribs. But it often happens that the second sacral also shows articulations, indicating the presence of a ninth pair of ribs, and it is interesting to note that when this extra pair of ribs is present there is usually found to be a rudimentary pair of parapophyses developed on the first true sacral, as if the rib creating force had been felt still further down the line of vertebræ.

Twenty-three out of one hundred and forty-four sacra had an extra,

ninth, pair of ribs, and one had an extra rib on one side only. In one case the ninth pair of ribs was completely fused with the sacrum, showing not the slightest trace of former articulation, although the eighth pair was free. Twenty-three sacra also, but not those just noted, were composed of fifteen vertebræ, owing to the inclusion of the seventh dorsal by ankylosis. Of course the number of caudals included in the sacral mass may be one less or one more, this depending largely on the age of the individual; but the normal "sacrum" is composed of five pre-sacrals, three true sacrals, and six uro-sacrals.

The Great Auk has the characteristic alcyonine sternum, and this is subject to the same variations found in other members of the family, the xiphoidal extremity being entire, perforate or notched.

These differences are largely due to age, notches becoming transformed into foramina, and foramina being obliterated by the extension of ossification into the membrane filling the vacuities. The same thing may be seen to some extent in the Loons, and the character of the xiphoid extremity of the sternum has by no means the same value among the generalized water birds that it has among the more specialized Passeres.

The extra ribs furnish another case in point, for although variation in the number of ribs is liable to occur among mammals, and is not infrequent in passerine birds, such variation would naturally be oftener found in more generalized forms.

The greater the number of similar skeletal parts and the more generalized the form the greater would seem the tendency to variation. Thus among the Urodele Batrachia the number of presacral vertebræ is not specifically constant, and so frequent are variations in the post-sacral region that total number of vertebræ is almost of no importance even as a specific character.

Fishes might seem to offer an exception to this for in the families *Serranidae*, *Sparidae* and *Carangidae* the number of abdominal and caudal vertebræ is not only remarkably constant for the species, but even for the family. But these fishes have a comparatively small number of vertebral segments (generally ten to fourteen), while in other members of the same superfamily, groups in which the number of vertebræ is greater, the amount of variation is greater. And the specialized Acanthopterygians mentioned stand in relation to other fishes much as the Passeres do to other birds.* Occasionally eight pairs of ribs were connected with the costal margin of the sternum, the normal number thus attached being seven.

It would be interesting to know if the sterna with eight pairs of costal facets belonged to the birds, with nine pairs of ribs, but this question can not be answered, although from one or two similar instances that have come under my notice among other birds it is quite probable that this was the case.

* For the above facts pertaining to fishes I am indebted to Dr. Theo. Gill.

The following table gives the result of the examination of thirty-one sterna, although it should be said that in some cases one costal border was wholly or partially lacking. Still as only one case occurs among the entire sterna in which the number of ribs attached to each side varied, the fact is comparatively unimportant.

Sterna with six pairs of articular facets	1
Sterna with seven pairs of articular facets	23
Sterna with eight pairs of articular facets	6
Sterna with seven facets on one side and eight on the other	1
Total number of sterna examined	31

Of the sterna with eight pairs of articular facets two had evidently borne a hæmapophysis attached to the second, posterior cervical rib. While the coracoid presents considerable variety in the amount of development of the epicoracoid as well as in the shape and extent of the sternal articular surface, it is always unmistakable in its general contour, and the same may be said of nearly all the bones of the Great Auk.

The greater number of humeri are from 103 to 108 mm in length, and it is interesting to note that the mean of three hundred humeri agrees very nicely with these figures, being 105.75 mm.

This bone, perhaps the most characteristic of the entire skeleton, seems to vary less in its proportions than any of the other long bones, not presenting such perceptible differences in diameter as are found in either the femur or tibia.

It is a little singular that the greatest amount of linear variation—taking into consideration the length of the bone—should be found in the femur, while it also shows very considerable differences of proportion, some femora being much more slender than others of the same length, the longest not always being the strongest.

The same differences of length and proportions found in the femur obtain to a lesser degree in the tibia, and also in the tarsus. This last bone occasionally develops a small tubercle on the postero-internal edge, about where the first metatarsal arises in four-toed birds, a peculiarity noticed by Professor Milne.

Thirteen out of one hundred and forty-two tarsi have this tubercle, and although it ordinarily appears to form an integral part of the tarsus there are some specimens which indicate that in young birds it may have been free, so that the tubercle probably represents a rudimentary first metatarsal.

This and the frequent presence of an extra pair of ribs would seem to be reversionary characters, hinting at some ancestral form with more digits and more ribs than the Great Auk.

The measurements of so considerable a number of bones from opposite sides may be looked upon as throwing some light on the question of correspondence in size between bones from the right and left sides,

although naturally the results are by no means so satisfactory as if each pair of bones came from one individual.

The bones measured were taken at hap-hazard, care being taken only to select such as were in good condition and whose measurements would not be lessened by any wearing away of their extremities. In the three following tables the vertical columns show the number of individuals, the horizontal giving the extreme length of the bone, in a straight line, in millimeters. The unbroken line represents bones from the right side, the interrupted line those from the left. In all cases an equal number of bones were taken from either side.

In all cases the perpendicular column indicates number of individuals, the horizontal column length in millimeters.

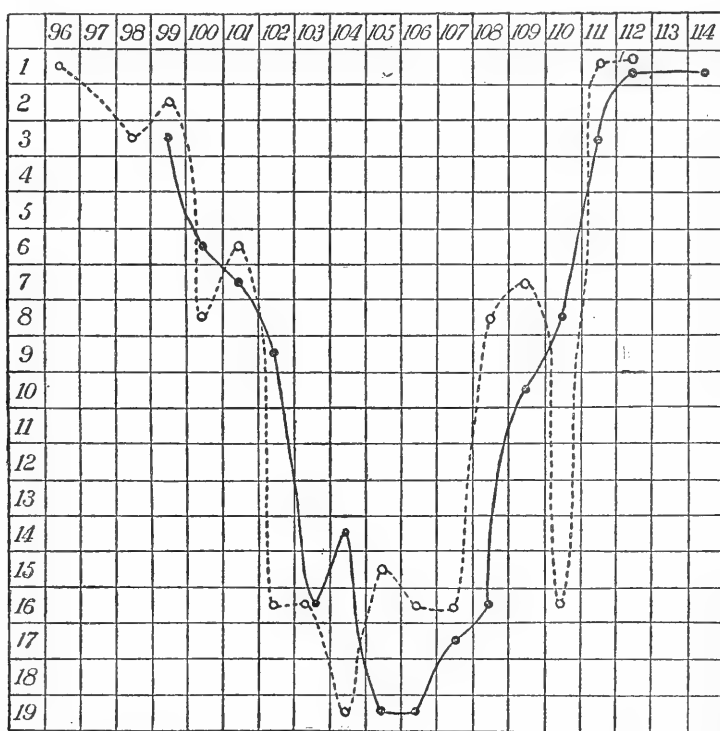


Diagram showing the measurements of three hundred humeri of the Great Auk, and the relation between those of the right and left side.

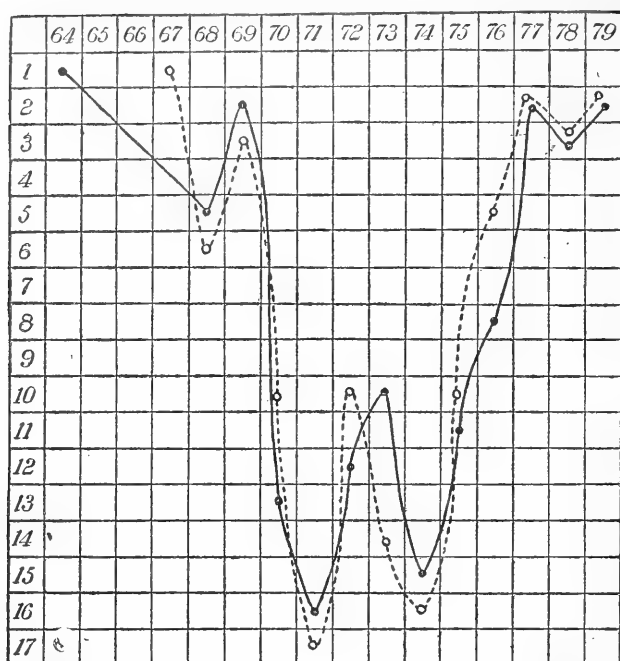


Diagram showing the measurements of two hundred femora of the Great Auk, and the relations between those of the right and left sides.

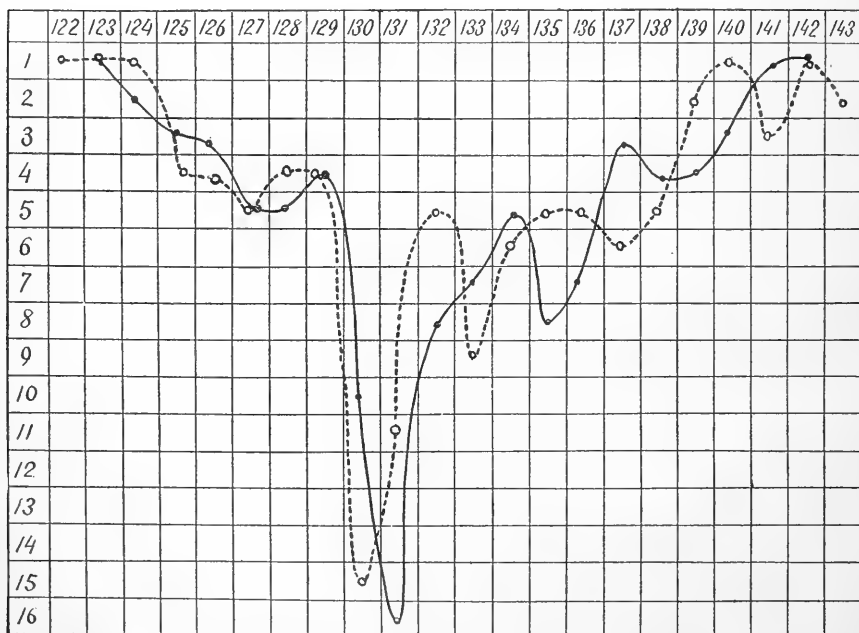


Diagram showing the measurements of two hundred tibiae of the Great Auk, and the relations between those of the right and left sides.

It is singular that the closest correspondence between the curves representing right and left sides should be exhibited by the diagrams giving the measurements of the femur, the most variable bone—while the least harmony is found among the humeri, bones which differ least among themselves.

This discrepancy is caused by an unusually large number of left humeri having a length of 110^{mm}, but on the whole the curves follow one another very closely, the maximum point being reached with great unanimity, and the sizes of the bones decreasing or increasing quite regularly from that.

From the examination of this large amount of material it would seem that considerable variation may exist in the size of individuals, that the number of ribs may be slightly inconstant and that a certain amount of variation may be found in the development of the various processes of the vertebræ. On the other hand the skull, sternum, and pelvis afford very substantial comparative characters.

In regard to the question of size, it can be said that there is nothing, as in the case of *Didine* remains, to indicate sexual difference in this particular, for between the largest and the smallest bones may be found all intermediate grades.

This, however, is what might have been expected, for the *Alcidae* present but slight sexual variations in size, while Professor Newton has pointed out a good reason for the slight amount of proportional variation in the fact that the bones represent individuals from the same epoch and locality, and not those separated from one another by long intervals of time or space.

Measurements, in millimeters, of Crania of the Great Auk.

	Cam- bridge,	18220.	18117.	18120.	18231.	18232.	18233.
Greatest length between perpendiculars...	165	150	152	152	158	155	162
Greatest parietal breadth above articula- tion of quadrate	50	48	45	48	48	48	48
Greatest post frontal breadth	49	51	49	51	48	48	48
Height from basi-sphenoid to frontal	32	32	33	32	32	33	33
Height of culmen immediately in front of nasal opening	25	22	22	22	23	23	23
Length from posterior end of occipital ridge to root of intermaxillary	62	61	58	61	58	61	61
Length of mandible	142	137	135	144	139	142	139
Length of mandibular symphysis	27	24	26	23	23	25	23

Measurements, in millimeters, of Crania of the Great Auk—Continued.

	A.	B.	C.	D.	E.	F.	G.	H.	I.
Greatest length between perpendiculars.....	150	160	160	158	160	159	153	155	157
Greatest parietal breadth above articulation of quadrate	43	48	48	47	48	45	47	48	48
Greatest post frontal breadth	48	51	51	48	51	45	48	48	51
Highest from basi-sphenoid to frontal	30	33	34	33	33	32	.....	33	32
Height of culmen immediately in front of nasal opening	23	25	26	22	23	22	23	22	24
Length from posterior end of occipital ridge to root of intermaxillary	54	63	61	62	61	60	61	60	63
Length of mandible	135	139	144	142	141	146	145	.....	.....
Length of mandibular symphysis	23	24	25	23	23	23	23	.....	.....

Measurements, in millimeters, of Sterna of Great Auk.

	A.	B.	C.	D.	E.	18117.
Length from manubrium to xiphoid extremity	211	193	196	204	206	196
Width across first pair of costal articulations	69	62	66	64	64	64
Width across seventh pair of costal articulations	48	47	49	45	.....	45
Xiphoid border, entire, notched, or perforate	1 perforation	2 notches	Entire.	2 perforations	Entire.	1 notch.
Least width	45	43	46	43	.....	45
Greatest posterior width	58	56	54	.....	.....	58
Depth from manubrium to keel	Broken	54	58	53	58	56

C.—LIST OF BOOKS AND PAPERS RELATING TO THE GREAT AUK

Although it is believed that no paper of importance has been omitted from this list, it is by no means a complete bibliography of the literature pertaining to the Great Auk.

The numerous incomplete lists of specimens have been designedly left out, as well as the republications of many articles and some short notes that contributed nothing to the subject.

Some short notes are cited from their bearing on particular points in the history of the Great Auk, and the earlier allusions to the Garefowl in America are included, owing to the general interest attached to them.

I am greatly indebted to Mr. Stejneger for assistance in preparing this portion of the paper, and have drawn upon the bibliography of Dr. Coues and from the monograph of Mr. Grieve, which contains a host of valuable references to the earlier notices of the Great Auk.

The edition of Hakluyt cited is that of 1600.

1534. Cartier, Jaques. The first relation of Jaques Carthier of S. Malo, of the new land called New France, newly discovered in the year of our Lord 1534.

<Hakluyt. Collection of voyages, vol. III, pp. 201-212.

Contains (p. 202) the earliest known reference to the Great Auk in America, and an account of Cartier's visit to Funk Island. Page 205 describes the Bird Rocks and again speaks of the Apponatz.

1535. Cartier, Jaques. A shorte and briefe narration of the navigations made by the commandment of the King of France to the ilauds of Canada, Hochelaga, Saguenay, and divers others which now are called New France, with the particular customs and maners of the inhabitants therein.

Hakluyt pp. 212-232.

Cartier's second voyage. On the 7th of July the ships stopped at Funk Island (the iland of birds) for provisions, this being the part of Newfoundland they first reached. "The Ilaud of Birds * * * lyeth from the maine land 14 leagnes, * * * it "hath the pole elevated 49 degrees and 40 minutes."

1536. Hore, Robert. The voyage of M. Hore and divers other gentlemen, to Newfoundland and Cape Briton in the yere 1536 and in the 28th yere of King Henry the 8.

Hakluyt, 129-131.

On page 130 is a reference to the island of Penguin, which from the course steered from Cape Breton would seem to be Penguin Islands, off Cape la Hune.

1578. Parkhurst, Anthonie. A letter written to M. Richard Hakluyt, of the middle Temple, containing a report of the true state and commodities of Newfoundland, by M. Anthonie Parkhurst, gentleman, 1578.

Hakluyt, 132-134.

On page 133 speaks of "one iland named Penguin, where we may drive them [Great Auks], on a planke into our ship as many as shall lade her." This is almost the exact language used by Whitbourne, and it looks as if it had been taken by him from Parkhurst. Parkhurst seems to have been engaged in the fishing business, and gives a very careful account of the composition of the Newfoundland fishing fleet, showing that in his time the English were greatly in the minority.

1583. Haies, Edward. A report of the voyage and successe thereof, attempted in the yere of our Lord 1583, by Sir Humfrey Gilbert, knight. * * * Written by M. Edward Haies, gentleman, and principall actour in the same voyage. * * *

Hakluyt, pp. 143-161.

Records on page 149, passing Funk Island, and mentions the Great Auk and the use of the salted birds by the French fishermen.

1583. Parmenius, Steven. Letter to Richard Hakluyt concerning the voyage of Sir Humphrey Gilbert.

Hakluyt, pp. 162-163.

Parmenius was among those lost with Gilbert on the *Delight*. He writes (p. 162), that on the 1st of August they came to "an island which your men call Penguin, because of the multitude of birdes of the same name." Curiously enough he states that they saw no birds.

1593. Fisher, Richard. The voyage of the ship called the *Marigold* of M. Hill of Redrife unto Cape Briton and beyond to the latitude of 44 degrees and an half; 1593. Written by Richard Fisher, Master Hilles man, of Redrife.

Hakluyt, pp. 191-193.

Speaks (p. 192) of the Pengwyns as seen at Cape Briton.

1622. Whitbourne, Richard. A discourse and discovery of Newfoundland, etc., written by Captain Richard Whitbourne, of Exmouth, in the county of Devon * * * Imprinted at London by Felix Kinston, 1622.

1672. Josselyn, John. New England's rarities discovered in birds, beasts, fishes, serpents, and plants of that country, etc. By John Josselyn, gent. London, 1672.

Mentions "The wobble, an ill-favored fowl, having no long feathers in their pinions, which is the reason why they cannot fly."

1785. Cartwright, George. Journal of Transactions and Events during a residence of nearly sixteen years on the Coast of Labrador.
Vol. III, page 55. "The birds which the people bring from thence (Funk Island) they salt and eat in lieu of salted pork." * * * The poor inhabitants of Fogo Island make voyages there to load with birds and eggs. When the water is smooth they make their shallop fast to the shore, lay their gang-boards from the gunwale of the boat to the rocks, and then drive as many penguins on board as she will hold, for the wings of these birds being remarkably short they cannot fly. But it has been customary of late years for several crews of men to live all summer on that island, for the sole purpose of killing birds for their feathers; the destruction which they have made is incredible. If a stop is not soon put to that practice, the whole breed will be diminished to almost nothing, particularly the penguins, for this is now the only island they have left to breed upon." This long quotation is given for the many interesting points it contains.
1822. Faber. Prodröm der isländischen Ornithologie, Kopenhagen. 1822.
States that when visiting the Westman Islands in August, 1821, he was told that it had been twenty years since a Great Auk had been seen there.
- 1827-'38. Audubon, J. J. The Birds of America; from original drawings, London, 1827-'38. Plate 341. Ornithological Biography, vol. IV, p. 316.
While Audubon never saw the bird alive, his figure is undoubtedly the best published. The Great Auk was a stout, thick-necked bird, built much on * the plan of the Razorbill, yet nearly all plates represent it as a sort of cross between a Murre and a Loon, with a small head, slender neck, and unduly obese body. Audubon's figure was probably made from an English specimen, and his knowledge of the bird's habits and habitat was derived from hearsay.
1837. Blyth, E. On the Osteology of the Great Auk (*Alca impennis*) in comparison with that of *Sphenisci*.
<P. Z. S., v. 837, pp. 122, 123.
1842. Bonnycastle, Richard. Newfoundland in 1842.
Vol. I, page 232, says that "the large Auk or Penguin (*Alca impennis* L.) which not fifty years ago was a sure sea-mark on the edge of and inside the banks, has totally disappeared from the ruthless trade in its eggs and skin."
1854. Lloyd, L. The Great Auk (*Alca impennis*) still found in Iceland.
<Edinb. New Philos. Journ., lvi, 1854, pp. 260-262.
Extract from his Scandinavi an Adventures, II, page 495.
- 1856-57. Steenstrup, J. Et Bidrag til Geirfuglens, *Alca impennis* Lin., Naturhistorie, og særligt til Kundskaben om dens tidligere Udbredningskreds.
<Vidensk. Meddel. Naturhist. Foren. Kjöbenhavn, for Aaret 1855, Nr. 3-7, 1856-'57, pp. 33-116, Kart og Tavle.
In this paper nearly all the known facts in regard to the Great Auk were brought together for the first time. Stuvitz's visit to Funk Island is quoted at some length and evidence brought forward to show that the Great Auk was not a dweller within the Arctic circle. There are two German and one French translation of this important paper, the most available being the French version in Bull. Soc. Ornith. Suisse, II, 1 e. pte., 1868, pp. 5-70.
- 1859? Charlton, E. On the Great Auk (*Alca impennis*).
<Trans. Tyneside Nat. Field Club, IV, 1859 (?), pp. 113 *et seq.* Reprinted in Zoologist, 1860, pp. 6883-6888.
Largely a compilation. Interesting as stating that the dried bodies of Auk and Guillemots are used for fuel on the Westmann Islands.
1860. McClintock, F. J. The Great Auk (*Alca impennis*).
<Zoologist, XVIII, 1860, 6981.
Notes that the Great Auk has not been met with by any of the modern Arctic expeditions.

1861. Newton, Alfred. Abstract of Mr. J. Wolley's Researches in Iceland, respecting the Gare-fowl, or Great Auk (*Alca impennis*, Linn).
 <Ibis, III, 1861, pp. 374-399. Reprinted in Zoologist, xx, 1862, pp. 8108-8130.
 An important paper, containing many bibliographical references. Shows the Great Auk to be extinct in Iceland, and that the bird never was so abundant there as had been supposed. Gives a very full account of the last specimens taken and their disposition.
1862. Preyer, W. Ueber *Plautus impennis* Brünn.
 <Journal für Ornithologie, x, 1862, pp. 110-124, 337-356.
 Systematic position, bibliography and synonymy, geographical distribution, past and present, and much historical matter.
1863. Newton, A. Remarks on the Exhibition of a Natural Mummy of *Alca Impennis*.
 <P. Z. S., 1862, pp. 435-438.
 This was one of the specimens obtained from Funk Island at the time the guano was removed.
1865. Field, E. Letter from the Right Rev. the Bishop of Newfoundland concerning the mummy of the Great Auk (*Alca impennis*) found on the Funk Islands.
 <Trans. Nova Scotia Inst. Nat. Sci., I, pt. III, 1865, p. 145.
 Notes that three "mummies" were found, one of which went to Prof. A. Newton, another to Prof. L. Agassiz, the third to J. M. Jones, president of the institution. This third specimen was presented by Mr. Jones to the British Museum.
1865. Owen, R. Description of the skeleton of the Great Auk, or Gare-Fowl (*Alca impennis*, L.).
 <Trans. Zool. Soc., London, Vol. v., pt. IV., 1865 (read 1864), pp. 317-335, pl. LI LII, and a small map.
 A detailed description of the skeleton of the Great Auk, from one of the three "mummied" specimens obtained at Funk Island in 1863. The paper is only to a slight extent comparative, other *Aleide* being very little touched upon, although some space is devoted to showing that the Great Auk was not related to the Penguins (*Spheniscide*).
1865. Newton, Alfred. The Gare-fowl and its Historians.
 <Nat. Hist. Rev., Oct., 1865, pp. 467-488.
 A valuable summary of the history of the bird, giving many bibliographical references. The writer considers that the Great Auk may still exist.
1868. Wyman, Jeffries. Note on the occurrence of bones of the Great Auk in a shell heap on Goose Island, Casco Bay, Maine.
 This shell heap was shown by Prof. E. S. Morse to be of great antiquity.
1868. Gurney, J. H., jr., The Great Auk (*Alca impennis*).
 <Zoologist, 2d ser., III, 1868, pp. 1442-1453.
 A critical review of the reported occurrence of the Great Auk in Scottish and British localities. Some of the reports are shown to rest on very slight foundation, and the fallibility of second hand testimony is clearly demonstrated.
1869. Gurney, J. H., jr. Notes on the Great Auk (*Alca impennis*).
 <Zoologist, 2d ser., IV, 1869, pp. 1639-1643.
 Contains description of winter plumage, and notices that not one of the specimens extant is in that dress.
1869. Orton, J. The Great Auk (*Alca impennis*).
 <Am. Nat., III, 1869, pp. 539-542.
 Contains but a single correct statement, that the Great Auk is extinct.
1869. Reeks, Henry. Notes on the Zoology of Newfoundland.
 <Zoologist, 2d ser., IV, 1869, pp. 1849-1858.
 Mainly remarks on the specimens taken from Funk Island in 1863.

1872. Collett, Robert. Remarks on the Ornithology of Northern Norway. Forhandl. Vidensk. Selsk. Christiania, 1872, pp. 182-309, with a map. Also reprinted separately, pp. 123.
Notes that the former occurrence of the Great Auk in Norway is very doubtful, descriptions of *Harelda glacialis* having been mistakenly referred to the Gare-fowl.
1872. Deane, R. Great Auk (*Alca impennis*).
<Am. Nat. vi, 1872, pp. 368-369.
Note of a specimen said to have been found dead near St. Augustin, Labrador, and sold for \$200. Sent to France to be mounted for an Austrian museum (Fide A. Lechevallier). If such a specimen were really found it seems to have utterly disappeared.
1872. Gurney, J. H., jr. Great Auk (*Alca impennis*) at Disco.
<Zoologist, 2d ser., vii, 1872, pp. 3064-3065.
Note on reported occurrences of Great Auks at Disco, Greenland.
1875. Milne, John. Relics of the Great Auk on Funk Island.
Reprinted from The Field of March 27, and April 3 and 10, 1875.
An account of the author's visit to Funk Island in 1874, with a résumé of various facts pertaining to the Great Auk.
1876. Allen, J. A. The Extinction of the Great Auk (*Alca impennis*) at the Funk Islands.
<Am. Nat., x., No. 1, Jan., 1876, p. 48.
Notes the destruction of the birds for their feathers and the use of the bodies for fuel.
1878. Newton, A. <Article Birds, Ency. Brit., ninth edition, vol III, pp. 734-735.
A brief account of the extermination of the Great Auk.
1879. Newton, A. Gare-fowl.
<Encyclopædia Britannica, ninth edition, x, pp. 78-80.
A necessarily brief history of the Great Auk, with list of more important papers pertaining to the subject.
1883. Cory, C. B. The Beautiful and Curious Birds of the World. Boston, 1883.
Plate V, with accompanying text.
The figure is three-quarters life size, but like most figures represents the bird with too large a body and too slender a neck.
1884. Blasius, Dr. Wilhelm. Ueber die letzten Vorkommnisse des Riesen-Alks (*Alca impennis*) und die in Braunschweig und an anderen Orten befindlichen Exemplare dieser Art.
Ver. f. Naturw. z. Braunschweig, III, Jahresber. f. 1881-'2-'3, pp. 89-114.
A concise résumé of the literature concerning the Great Auk, followed by a detailed account of the specimens contained in the Brunswick Museum.
1884. Blasius, Dr. Wilhelm. Zur Geschichte der Ueberreste von *Alca impennis* Linn.
<Cabanis' Journal für Ornithologie, Januar, 1884, pp. 58-176.
A detailed list of all known specimens of the Great Auk, alphabetically arranged, preceded by a brief résumé of the literature on the subject.
1884. Collett, Robert. Ueber *Alca impennis* in Norwegen.
<Mitth. Ornith. Ver. Wien, 1884, pp. 65-69, 87-89.
Notes that the Great Auk has probably been seen but once in Norway. Special reference to Stuvitz's visit to Funk Island, and description of his specimens preserved in Christiania. More or less complete skulls of thirty-eight individuals, and many separate bones.
1885. Grieve, Symington. The Great Auk or Garefowl (*Alca impennis* Linn), Its History, Archaeology, and Remains, by Symington Grieve, Edinburgh, London; Thomas C. Jack, 45 Ludgate Hill, Edinburgh; Grange Publishing Works, 1885, xii, pp. 142, 58 (Appendix). Four plates, several cuts in the text, and a map showing the distribution of the Great Auk.

1885. Grieve, Symington—Continued.

A most important contribution to the history of the Garefowl, containing a very full account of what is known concerning its habits, habitat, and history. A list is given of all known specimens, skins, skeletons, and eggs, and there are a very large number of references to the literature of the subject.

1886. S [tejuener], L. Grieve on the Great Auk or Garefowl.

<Auk, III, April, 1886, pp. 262-265.

A review of Grieve's monograph. It is shown that there is but one specimen in the Am. Mus. Nat. Hist., New York, and but one "mummy" in the Mus. Comp. Zool., Cambridge.

1888. Lucas, Frederic A. Great Auk Notes.

<The Auk, July, 1888.

Notes on some of the supposed breeding places of the Great Auk, criticisms on the published figures of the bird, etc. The writer considers that the Great Auk was much more restricted in habitat than is usually supposed, and looks upon its occurrence at the Bird Rocks, Gulf of St. Lawrence, as doubtful.

1888. Lucas, Frederic A. The Home of the Great Auk.

<Popular Science Monthly, August 1888, pp. 456-464.

A description of Funk Island, the visit of the *Grampus* party, and their collections.

1888. Grieve, Symington. Recent notes on the Great Auk or Garefowl (*Alca impennis* Linn.).

<Transactions of the Edinburgh Field Naturalists and Microscopical Society. The presidential address of the twentieth session of the society.

Contains the most recent information in regard to the Great Auk, with many references to the work and collections of the *Grampus* expedition. Changes in the disposition of Auk remains made since the publication of the writer's monograph on the Great Auk are recorded and a few slight errors therein contained are corrected.

H. Mis. 142, pt. 2—34

EXPLANATION OF PLATE LXXII.

THE GREAT AUK.

ABOUT ONE-QUARTER NATURAL SIZE.

From the specimen in the U. S. National Museum, No. 57338.

Wilhelm Schluter, of Halle, Germany, from whom this Auk was procured, gives its history as follows: It was obtained by Mr. Salmin, of Hamburg, from Iceland; by him sold to a merchant of Hamburg, who sold it to Mr. Goetz, of Dresden, who in turn parted with it to Mr. Schluter.

In the U. S. National Museum catalogue of birds it is recorded as ♂ ad. Eldey, June, 1834.

Since the photograph was taken from which the accompanying plate was made the specimen has been remounted in a different attitude and shortened between two and three inches. It is still, like nearly all mounted skins, considerably too long, but could not be shortened any more without cutting the skin, a proceeding that, under the circumstances, was deemed inadmissible.

Before remounting a full-sized figure of the specimen was made.



THE GREAT AUK.

EXPLANATION OF PLATE LXXIII.

EGG OF THE GREAT AUK.

ABOUT FOUR-FIFTHS NATURAL SIZE.

From the original in the collection of the U. S. National Museum, No. 15141.

The specimen measures 125^{mm} by 74^{mm}. This egg was obtained from the Academy of Natural Sciences, Philadelphia, Pa., and was originally in the collection of O. des Murs.

It is the egg figured on Plate I, *Revue et Magazin de Zoologie*, 1863, and the one to which des Murs refers in the text as having been broken and restored. That des Murs had *three* eggs of the Great Auk is extremely improbable, as he states that he never even saw more than the two in his possession, and the reference to three is either a slip of the pen or of memory.

The egg seems to have been washed since it was figured, and the freshness of the markings thereby impaired.



EGG OF THE GREAT AUK.

FIRE-MAKING APPARATUS IN THE U. S. NATIONAL MUSEUM.

By WALTER HOUGH.

Man in his originals seems to be a thing unarmed and naked, and unable to help itself, as needing the aid of many things; therefore Prometheus makes haste to find out fire, which suppediates and yields comfort and help in a manner to all human wants and necessities; so that if the soul be the form of forms, and the hand be the instrument of instruments, fire deserves well to be called the succor of succors, or the help of helps, that infinite ways afford aid and assistance to all labors and the mechanical arts, and to the sciences themselves.—BACON.—*Wisdom of the ancients, Prometheus, Works*, vol. iii. Lond., 1825, p. 72.

There is a prevalent belief that to make fire by rubbing two pieces of wood is very difficult. It is not so; the writer has repeatedly made fire in thirty seconds by the twirling sticks and in five seconds with the bow drill.

Many travelers relate that they have seen various peoples make fire with sticks of wood. The most common way, by twirling one stick upon another is well described by Pere Lafitau with reference to the Hurons and Iroquois.

They take two pieces of cedar wood, dry and light; they hold one piece firmly down with the knee and in a cavity which they have made with a beaver-tooth or with the point of a knife on the edge of one of these pieces of wood which is flat and a little larger, they insert the other piece which is round and pointed and turn and press down with so much rapidity and violence that the material of the wood agitated with vehemence falls off in a rain of fire by means of a crack or little canal which leaps from the cavity over a match [slow match]. This match receives the sparks which fall, and preserves them for a long time and from which they can make a large fire by touching it to other dry materials.*

All these descriptions omit details that are essential to the comprehension of the reader. There is a great knack in twirling the vertical stick. It is taken between the palms of the outstretched hands, which are drawn backwards and forwards past each other almost to the finger tips, thus giving the drill a reciprocating motion. At the same time a strong downward pressure, is given which may be called a rotating pressure. The hands move down the drill; when they nearly reach the lower end they are brought back to the top with a quick, deft motion. This is repeated as rapidly as possible. If the lower part of the drill is observed when the motion begins it will be seen that powder is ground

* Lafitau.—*Moeurs des Sauvages Americains*. Paris, 1724. II, p. 242, 243.

off and is collecting in the canal cut into the cavity from the side of the lower piece of wood. Soon, as the motion progresses, the powder begins to increase and to get darker, the odor of burning wood is noticed and the smoke is seen. Probably when the next motion ceases there will be a little curl of peculiarly colored smoke, which shows that active combustion has begun. The pellet of ground-off wood may now be shaken out of the slot or canal. At first it is dark; a thin line of smoke comes from it; gradually the fire spreads through it until it glows. In this semi-charred dust the heat is held until it increases to about 450° , or higher. Everything depends on keeping the dust in a heap; it is impossible to make fire without doing this. This is true in all kinds of wooden fire-making tools.

By examination of many specimens of aboriginal fire apparatus it is found that both the drill and lower piece, which, for convenience, shall be called the hearth, must be of dry, inflammable wood. Wood that is soft from incipient decay is chosen; most often pieces riddled by worms. This is the *felicis materia* spoken of by Festus as used by the Vestals. Wood of this kind is not only easier of ignition, but it is ground off more easily and retains the heat generated until enough is accumulated to ignite the powder. In strong, skillful hands fire can be made from wood that does not wholly fulfill these conditions.

Woods vary in combustibility, depending on their density, coloring matter, and, perhaps, their chemical constitution. Sap wood of juniper and soft, white maple yield fire with the bow, but light mesquite is the best of all. The vascular, starchy flowering stems of plants have always been a favorite fire-generating material.

It will be seen that the Eskimo attachments to the simple drill enable him to use wood ordinarily of no account for making fire. Sand is used by Indians and other peoples to increase the friction.

From the material in the collection at the Museum, it is found that nearly every method that is or was used in the world is represented. The following classification, based upon the presumed order of development of the invention, is followed in this paper:

I.—Fire-making by reciprocating motion.

1. *Simple, two-stick apparatus*: Indians of the two Americas, Ainos, Somalis, Kaffirs, Veddahs, Australians, etc.
2. *Four-part apparatus*: Eskimo, some Indians, Hindoos, and Dyaks.
3. *Weighted drill, with spindle whorl*; Iroquois and Chukchis.

II.—Fire-making by sawing.

Malays, Burmese, etc.

III.—Fire-making by plowing.

Polynesians, Australians, and Papuans.

IV.—Fire-making by percussion.

1. *With pyrites, or stone containing iron, and flint*: Eskimo and northern Indians.
2. *With flint and steel*: General.

I. FIRE-MAKING BY RECIPROCATING MOTION.

1. SIMPLE TWO-STICK APPARATUS.

This method may be said to have a world-wide distribution, and to have had no narrow range in time. It is a very interesting study to observe the many different practices that have been superadded to the simple task of twirling two sticks with the design of creating fire. It is also instructive to note how fixed have become tribal characters in so small a thing as the shaping of the elements of the fire drill. It has well been said by Dr. Schweinfurth, that—

A people, as long as they are on the lowest step of their development, are far better characterized by their industrial products than they are either by their habits, which may be purely local, or by their own representations, which (rendered in their rude and unformed language) are often incorrectly interpreted by ourselves. If we possessed more of these tokens we should be in a position to comprehend better than we do the primitive condition of many a nation that has now reached a high degree of culture.*

This fact holds good with reference to tribes in a higher plane than the learned writer included in this statement, in this way. There are many little things that have not been subject to the modification of time, intercourse, or environment, but co-exist with an art. To particularize: Prof. E. S. Morse has shown the value of the simple act of releasing an arrow from a bow-string as a classifier. Close attention to the minor acts and arts will reveal much more than the nice measurements of man's practically unmodified skeleton.

Differences that have become functional in the arts have come down from an early period; when they can be found they are of the greatest value as aids in ethnology.

The ethnography of the simple fire drill is studied geographically, beginning in North America with the most northerly tribes that use it, and ranging from north to south in the different sections of the country, among the tribes from which there are specimens in the Museum. Other countries are examined from west to east.

The Sitkan fire-drill spindle is unusually long and thick (fig. 1). Both hearth and drills are of the *Thuja gigantea*, a tree that enters so largely into the life of the Indians along this coast. The wood grinds off very well with much friction; at ordinary speed there is soon a small heap of powder at the bottom of the fire slot. The latter is deeply cut in from the side nearly to the center of the fire-hole. The whole hearth has been charred at the fire. This repels moisture, and also renders it easier to ignite the wood, charring being a process somewhat analogous to the decay of wood by rotting. If kept carefully in a dry place, this apparatus was perfectly adequate for the purpose of the Sitkan, and in his skillful hands would no doubt give the spark in a minute or so. The long drill would indicate that two worked at it consecutively

* Schweinfurth.—The Heart of Africa. New York, 1874. I, p. 257.

to keep up a continuous motion, as will be noted in the use of the Aino drill (p. 551).

For tinder, the bark of the arbor vitae was used. It is finely frayed, and is much improved by being slightly charred. They also use, preferably, a tinder made from a fungus, because it is "quicker," *i. e.*, ignites more readily than the frayed bark.

The hearth is squared and measures 23 inches; the drill is of equal length.

Going southward from Sitka the next fire-making set in the series is from Bella-Bella, British Columbia. These Indians are of the Salishan stock, and are called Bilhulas. The horizontal is a piece of cedar wood dressed square on three faces. It is apparently a piece of an oar or spear handle. The fire-holes are shallow, and the fire slots are quite narrow (fig. 2). The drills have been scored longitudinally near the rubbing end; this may be a device to cause the wood to wear away more rapidly, and furnish fuel to the incipient fire. Fire has evidently been made with this set. Both parts are $1\frac{1}{2}$ feet long; the drill is much thinner than that of Sitka. The tinder is of frayed cedar bark.

From a southern family of the Salishan stock, called the Quinaielt Indians, of Washington Territory, the museum has a complete set collected by the late Charles Willoughby. It consists of a hearth, two drills, and a slow-match. The hearth is a rounded piece of cedar wood; opposite the fire-holes it is dressed flat, so as to rest firmly on the ground. There are three fire-holes with wide notches. The drills taper to each end, that is, are larger in the middle (fig. 3). The powder, a fine brown dust, collects at the junction of the slot and fire-hole, where they form a lip and there readily ignites. This side of the hearth is semi-decayed. No doubt the slots were cut in that side for the purpose of utilizing this quality. The drills are bulged toward the middle, thereby rendering it possible to give great pressure and at the same time rapid rotation without allowing the hands to slip down too rapidly, a fault in many fire-drills. The slow-match is of frayed cedar bark, about a yard long, folded squarely together, and used section by section. Mr. Willoughby says:

The stick with three cavities was placed upon the ground, the Indian kneeling and placing a knee upon each end. He placed one end of the smaller stick in one of the cavities, and, holding the other end between the palms of his hands, kept up a rapid half-rotary motion, causing an amount of friction sufficient to produce fire. With this he lighted the end of the braided slow-match of cedar bark. This was often carried for weeks thus ignited and held carefully beneath the blanket to protect it from wind and rain.

Fire is easily procured with this set. It takes but a slight effort to cause a wreath of aromatic smoke to curl up, and the friction easily grinds off a dark powder, which collects between the edges of the slot. When this ignites it drops down the slot in a little pellet, and falls upon the tinder placed below to receive it. Both drill and hearth are 18 inches long.

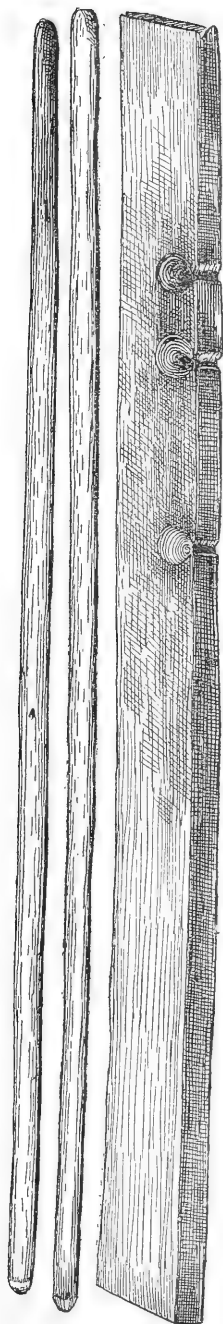


Fig. 1.

FIRE-MAKING SET.

(Cat. No 74,379, U. S. N. M. Thingit Indians, Sitka, Alaska. Collected by John J. McLean.)

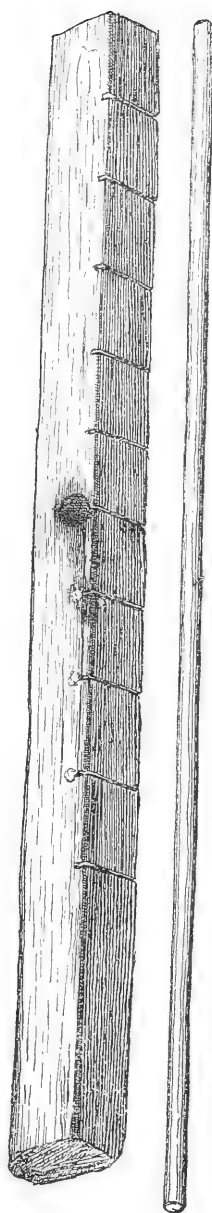


Fig. 2.

FIRE-MAKING SET.

(Cat. No 20,644, U. S. N. M. Bella-Bella, B. C. Collected by James G. Swan.)

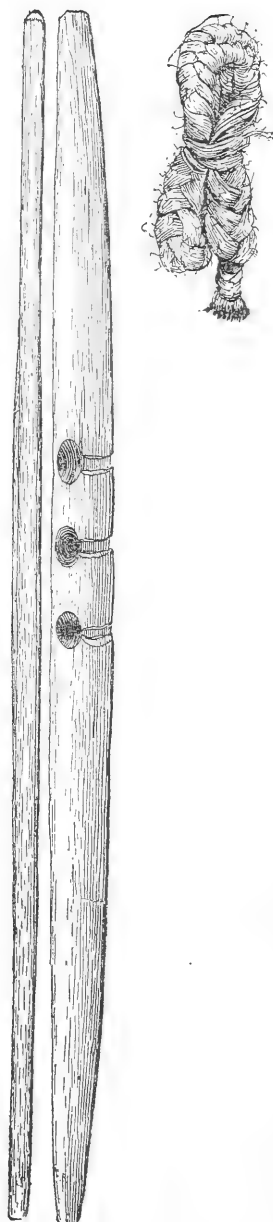


Fig. 3.

FIRE-MAKING SET AND SLOW MATCH.

(Cat. No 127,866, U. S. N. M. Quinault Indians, Quinalt, Washington. Collected by Charles Willoughby.)

The Klamaths, of Oregon, of the Lutuamian stock, use a fire apparatus that looks very much like that of the Utes. The hearth is a rounded piece of soft wood thinned down at the ends (fig. 4). The drill is a long, round arrow-stick, with a hard-wood point set in with resin and served with sinew (see Ute drill, fig. 7). The holes in this hearth are very small, being less than three-eighths of an inch in diameter. They are in the center, and the fire slot being cut into the rounded edge widens out below, so that the coal can drop down and get draught. The wood is quite soft, apparently being sap-wood of yew or cedar, while the drill-point is of the hardest wood obtainable. It is probable that sand is used on the drill. The hearth is 13 inches long, and the drill 26.

The Chinooks, a tribe of Indians of a separate stock, called Chinookan, formerly lived about the mouth of the Columbia River, in Oregon, but are now nearly extinct. Hon. James G. Swan, the veteran explorer, investigator, and collector among the Northwest coast tribes, says that the Chinooks are the best wet-weather fire-makers he ever knew.*

To kindle a fire the Chinook twirls rapidly between the palms a cedar stick, the point of which is pressed into a small hollow in a flat piece of the same material, the sparks falling on finely frayed bark. Sticks are commonly carried for the purpose, improving with use.†

Mr. Paul Kane‡ describes the hearth as a "flat piece of dry cedar,

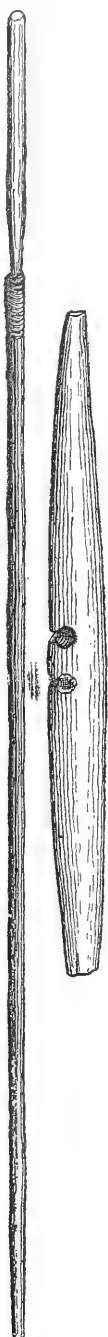


Fig. 4.

FIRE-MAKING SET.

(Cat. No. 24096, U. S. N. M.,
Klamath Indians, Oregon.
Collected by L. S. Dyar.)

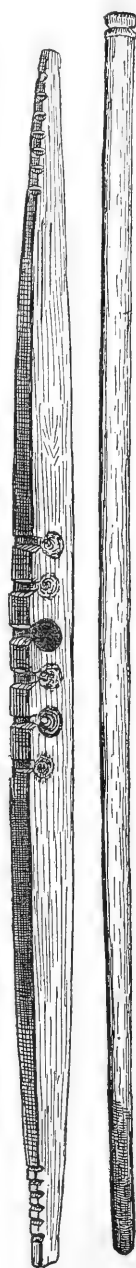


Fig. 5.

FIRE-MAKING SET.

(Cat. No. 77193, U. S. N. M., Hupa
Indians, California. Collected by
Lieut. P. H. Ray, U. S. A.)

* Swan.—Northwest Coast. p. 248.

† Bancroft.—Native Races. I., p. 237.

‡ Kane.—Wanderings of an Artist among
the Indians. London, 1859.

in which a small hollow is cut with a channel for the ignited charcoal to run over. In a short time sparks begin to fall through the channel upon finely frayed cedar bark placed underneath, which they soon ignite." The Ahts and Haidas also use cedar fire-sticks of the usual Indian kind.

The Hupa Indians of California are of the Athapascan stock. Their fire-drill is a carefully made piece of apparatus (fig. 5). The hearth is of a reddish, punky piece, probably of mesquite, *Prosopis juliflora*, somewhat harder than the drill, which is charred slightly for some distance along the grinding end. Fire has been made in one of the holes; the others show the rough, frayed cavities which have been made to start the drill. The notches at each end of the hearth seem to be to facilitate the tying of the pieces together as a precaution to prevent their loss or separation. They are usually intrusted into the hands of the most skillful fire-maker, who wraps them up to keep them from becoming damp. The effectiveness of the sticks increases with use and age; a stick and hearth that have been charred by the former making of fire in most cases yields the spark in half the time required for new apparatus. Another advantage is that the drill is softer from incipient decay.

That this set is in the highest degree efficient is shown by the fact that the writer repeatedly got a glowing coal, the size of a pea, from it in less than twenty seconds. The hearth is 18 and the drill 21 inches long.

The McCloud River Indians (Copehan stock) make the drill from the buckeye tree.

The Indians of Washoe, Nevada, from their language, have been classed by the Bureau of Ethnology as a separate stock, the Washoan. Stephen Powers, many years ago collected a rather remarkable hearth from these Indians. It has eight rather small holes, in every one of which fire has been made. The wood is soft, well-seasoned pine. Apparently sand has been made use of to get greater friction, as is the custom of the Zuñis and Apaches. This device, in a measure, obviates the necessity of having tinder-like wood, or wood in a state of partial decay. For the drill any hardwood cylindrical stick might be employed. A strip of buckskin about an inch wide is passed around the hearth over the fire-holes to keep them dry (fig. 6).

At the end of the hearth is a mass of cement made of the resin of a pine mixed with sand, apparently; a kind of material used by the Indians over a large area in the Great Basin and southward to fix their arrowheads, pitch the water-bottles, and for other purposes. It is quite probable that this stick was the property of an arrow-maker, whose need of fire to melt the somewhat intractable cement, caused him to combine these functions in one tool.

It has a better finish, and displays greater skill in its manufacture than the fire-tools of the neighboring tribes of Shoshonian (Utes) and

Moquelumnan stocks. In fact, it has a close affinity in appearance to

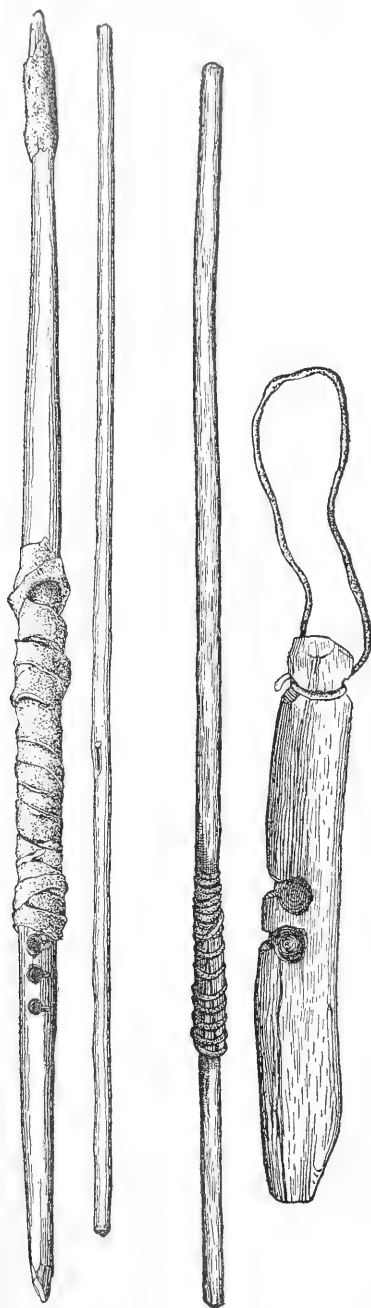


Fig. 6.

FIRE-MAKING SET.

(Cat. No. 19640, U. S. N. M.
Washoe Indians, Nevada.
Collected by Stephen Pow-
ers.)

Fig. 7.

FIRE-MAKING SET.

(Cat. No. 17230, U. S. N. M.
Pai-Ute Indians, Southern Utah.
Collected by Maj. J. W. Powell.)

those of the very near Athapascan (Hupa, etc.) stock. It is a matter of very great interest to compare with this a stick from the Mackenzie River. (See Fig. 28.) The resemblance is striking; it is as though one found a word of familiar sound and import in an unexpected place. The related tribes of the Indians dwelling on the Mackenzie have a wider range than the distance between the localities whence the respective sticks came; in fact, the Athapascans range about 50 degrees in latitude and the southern colonies of this great family are only about 250 miles southeast of the Washoans, while, as has been stated, the Hupas are quite near.

It would be presumptuous to say at present that this tool is a remnant of the influence of the Athapascan wave that swept along the Great Interior Basin, leaving groups here and there in California and other parts to mark its progress, but there is more to its credit than a coincidence of form and function.

The museum is in possession of a complete collection of fire-making material from the tribes of the Shoshonian stock. They were collected by Maj. J. W. Powell. The native name for the Ute fire set is *wlu-tu ni-weap*. While the lower member of the set—the hearth—differs among the several tribes in point of material, shape, etc., the spliced drill is characteristic of the whole stock. It has never been noticed outside of the southern part of the Great Interior Basin but in one instance—among the

Klamaths of Oregon. The main part of the drill is either a reed, or a straight sprout, usually the former. At one end a short piece of very hard wood—greasewood, *sarcobatus vermiculatus*—is set in and lashed with sinew. It resembles the Shoshonian arrows, which are foreshafted in this way. They also use sand in common with other neighboring tribes.

The Pai-Utes, of Southern Utah, make their hearths of a short, rounded piece usually of the sapwood of juniper. It is tied to the drill with a thong of buckskin when not in use (fig. 7). The drill is like the usual one, just described. This is the common form of the Pai-Ute apparatus. The small, two-holed hearth of rounded form, and the shortened, spliced drill are for convenience of carrying, this kind being used by hunters while away from the lodges. Mr. S. J. Hare says that the men do not usually make the fire, except when out on a hunting excursion. At the lodge it is the squaw's duty to make the fire when it is needed.

The Pai-Ute is rarely at a loss to get fire; he is master of various devices. Mr. Hare, who was among the Utes for some time, states that when the Indian is in need of a light he uses either the flint and steel, the drill, or, if these are not at hand, he takes two branches, and rubs one up and down on the other, soon getting fire. The Australians are said to have practiced fire-making by rubbing in the way mentioned. This is the only observation collected of its occurrence in America. It is, in all probability, a difficult, unusual way; only practiced under pressure of necessity among the Utes. They take great



Fig. 8.

FIRE-MAKING SET.

(Cat. No. 11976, U. S. N. M., Pai-Ute Indians, Southern Utah. Collected by Maj. J. W. Powell.)

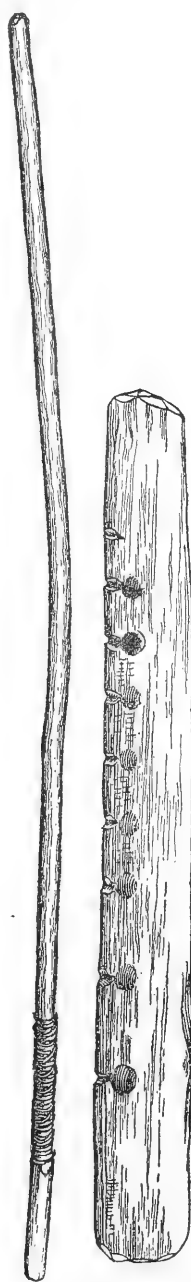


Fig. 9.

FIRE-MAKING SET.

(Cat. No. 22022, U. S. N. M., Shoshone Indians, Wind River, Wyoming. Collected by Maj. J. W. Powell.)

pride in their skill; to be a quick fire-maker is to achieve fame in the tribe. They are fond of exhibiting their art to white travelers in the hope of gain.

Another form of hearth (fig. 8.) is made of yucca flower stalk, like those of the Apache and Navajos. The drill is of tule reed, set with a very hard wood head. It is suggested that the reason for splicing the drill is that the hard wood of the kind used for the head (grease-wood) can not be procured in pieces long enough to make the whole drill. This set is apparently one used as a fixture in the Ute domestic economy, the squaws having to light the fire. The duty is mainly relegated to the females in several other Indian tribes, and among the Eskimo. Mr. Catlin says that the Sioux objected to letting the squaws have their portraits painted, saying that their women had never taken scalps, nor done anything better than make fires and dress skins.* The hearth and drill last figured are respectively 20 and 23 inches long, while in the hunting set (fig. 8) the length is 7 and 18 inches.

The Wind River Shoshones are also represented (fig. 9). The hearth is of hard wood, rudely hacked out, and rounded. Upon the slanting edge are eight holes, or shallow depressions, prepared for the drill, with notches cut in to meet them from the sides. The drill is a willow branch, 25 inches long, with a hard wood head mortised in, and served with buckskin. It is most probable that sand was used with this set, because, if the parts are not models, it would be necessary to use it on sticks of equal hardness like these. I am inclined to believe that they are models, from their appearance, and from the difficulty of setting up a pyrogenic friction upon them even with sand. They were collected some fifteen years ago by Maj. J. W. Powell.

The Mokis are the most differentiated members of the Shoshonian stock. Mrs. T. E. Stevenson collected the two excellent fire-making sets in the Museum from the Moki Pueblos. The hearth is a branch of the very best quality of soft wood. In one hearth an end has been broken off, but there still remain eighteen fire-holes, showing that it was in use for a long time and highly prized (fig. 10). The drill is a roughly dressed branch of hard wood. It is comparatively easy to make fire on this apparatus. In the set numbered 126,694 these conditions are reversed; the hearth is tolerably hard wood and the drill soft wood.

The Moki fire-tools are used now principally in the estufas to light the sacred fire and the new fire as do the Zuñis, and the Aztecs of Mexico did hundreds of years ago. They use tinder of fungus or dried grass rubbed between the hands.

By their language the Zuñi people belong to a distinct stock of Indians. Their fire-sticks are of the agave stalk, a soft, pithy wood with harder longitudinal fibers, rendering it a good medium for the purpose of making fire.

*Smithsonian Report. 1885. Pt. ii, p. 723.

As to the plan pursued in grinding out fire, Col. James Stevenson informed the writer that they make a slightly concave place where the burnt holes are seen, cut the notch on the side, sprinkle a little fine sand on the concavity, set the end of the round stick on the sand and roll it rapidly between the palms of the hands, pressing down hard. The "sawdust," Colonel Stevenson called it, oozes out of the notch and forms a small mass, which on blowing slightly becomes a burning coal, and the application of a little tinder creates a blaze. For preserving the fire for any length of time they use a piece of decayed wood. (Figs. 11 and 12.)

Viewed in another aspect than as an implement of necessary or common use, this set is an important cult apparatus in the wonderfully complicated religious worship of the Zuñis. These people make the sacred fire that burns always in their estufas by friction of wood that has been wet. New fire is made at the beginning of their new year with great ceremony. The house is swept and everything is moved out of it until the fire is made. Their regard for fire and their customs with reference to it add

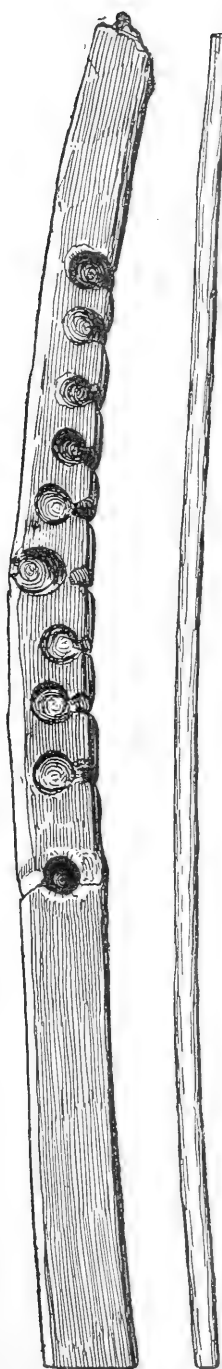
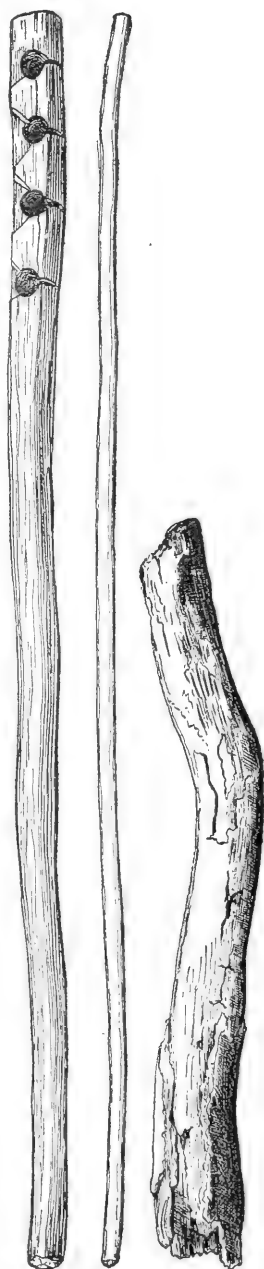


Fig. 10.

FIRE-MAKING SET.

(Cat. No. 128694, U. S. N. M., Mex. Indians, Arizona. Collected by Mr. T. E. Stevenson.)



Figs. 11 and 12.

FIRE-MAKING SET AND SLOW MATCH.

(Cat. Nos. 127708 and 69850, U. S. N. M., Zuñi Indians, New Mexico. Collected by James Stevenson.)

them to the list of peoples who have held it in similar reverence and have practiced similar customs all over the world, ranging widely in time. The wetting of the drill, increasing their labor, may be done to please their Gods.

This art must have been practiced for a long time in this region, for Mr. Henry Metcalf found a hearth (Fig. 13) with three fire-holes in a cave-dwelling at Silver City, New Mexico. It is apparently very ancient. The wood is much altered and has become heavy by impregnation with some salt, probably niter.

The Apaches and Navajos belong to the great Athapascan stock, that ranges so widely in North America. Capt. John G. Bourke, U. S. Army, collected the hearth of yucca wood shown (Fig. 14), and says:

With the stick you now see, the Apache Indians in my presence made fire in not quite eight seconds by the watch, and one asserted that he could make it in a number of motions, which, on the watch, occupied exactly two seconds, that is, under most favorable circumstances. The experiments, made under my own observation, ran all the way from eight to forty-seven seconds; sand is generally used, although not essential to success.

Captain Bourke's observation is very interesting, as it records the fact that the Apache is the most skillful fire-maker in the world. Many other tribes can make fire in less than a minute; I think by far the majority of them, but there is no eight-second record, while if he could prove his ability to do it in two seconds he would arrive at the facility of striking a match.

Mr. William F. Corbusier has noticed the fire-making of the Apache-Yumas of Arizona (Yuman stock).^{*} They use a drill about 2 feet long and one-half inch thick, made of *o-oh-kad-je*, or "Fire-stick bush." Its end is dipped in sand and drilled on a soft piece of agave or yucca stalk held down by the feet. They carry a slow torch of dead wood (spunk)



Fig. 13.

LOWER STICK OF FIRE-
MAKING SET.

(Cat. No. 35568, U. S. N. M.
From a cave at Silver City,
New Mexico. Collected by
Henry Metcalf.)



Fig. 14.

LOWER PIECE OF FIRE-
MAKING SET.

(Cat. No. 190276, U. S. N. M.
Apache Indians, Arizona.
Collected by Capt. John G.
Bourke, U. S. A.)

^{*}American Antiquarian. Mendon, Ill.
nois, September, 1886, VIII, p. 283.

and also use a flint and steel. For tinder they use dry grass or bark fiber. They use also a fungus, *polyporus* sp., for the same purpose.

Another reference to the fire making of this stock (Yuman) is found in the translation by the late Dr. Charles Rau of the writings of Father Baegert on the Californian Peninsula.* He says:

To light a fire, the Californian makes no use of steel and flint, but obtains it by the friction of two pieces of wood. One of them is cylindrical and pointed at one end, which fits into a round cavity in the other, and by turning the cylindrical piece with great rapidity between their hands, like a twirling-stick, they succeed in igniting the lower piece if they continue the process for a sufficient length of time.

The Navajo fire-set looks very much like a mere makeshift. The hearth is a piece of yucca stalk and the fire-holes have but a shallow side notch. The drill is a broken arrow shaft, to which has been rudely lashed with a cotton rag a smaller piece of yucca wood (fig. 15). This carelessness, which it is rather than lack of skill, is characteristic of the Navajos in their minor implements. They resemble the crude Apache in this. One thinks of the Navajos only with regard to their fine blanket weaving and silver working, so well presented by Dr. Washington Matthews in the reports of the Bureau of Ethnology, and does not consider their arts in other lines.†

Mr. Thomas C. Battey, a Friend, long missionary among the Indians, kindly gives a description of the Kiowan fire-making process, not now practiced among them, but shown to him as a relic of an abandoned art:

A piece of very hard and coarse, rough-grained wood, perhaps 8 inches in length, 2 in width, and three-fourths of an inch in thickness is procured. In one side of this and near one edge several holes are made, about one-half an inch in diameter by five-eighths of an inch in depth, rounded at the bottom, but left somewhat rough or very slightly corrugated. In the edge nearest these holes a corresponding number of smaller and tapering holes are made, opening by a small orifice into the bottom of each of the larger ones. These are made very smooth.

A straight stick, also of hard, rough-grained wood, about 8 or 10 inches in length, about the size they usually make their

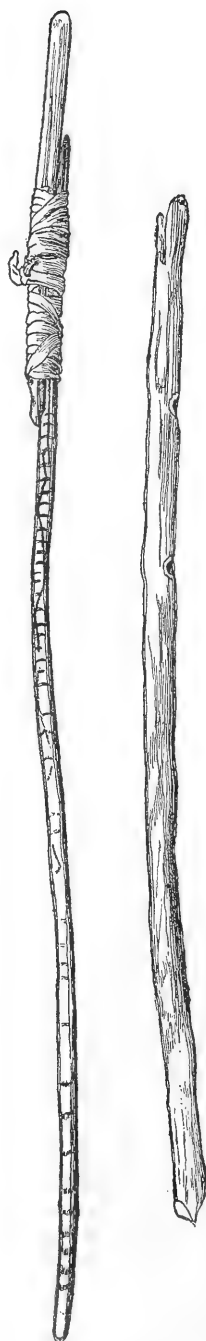


Fig. 15.
FIRE-MAKING SET.

(Cat. No. 5555, U. S. N. M. Navajo
Indians, New Mexico. Collected
by Edward Palmer.)

*Smithsonian Report, 1865, p. 367.

†Dr. Matthews's mountain chant of the Navajos, in the fifth annual report (1893-'94) of the Bureau of Ethnology, gives some very striking ceremonial uses of fire. No ethnologist should fail to read this important contribution to science.

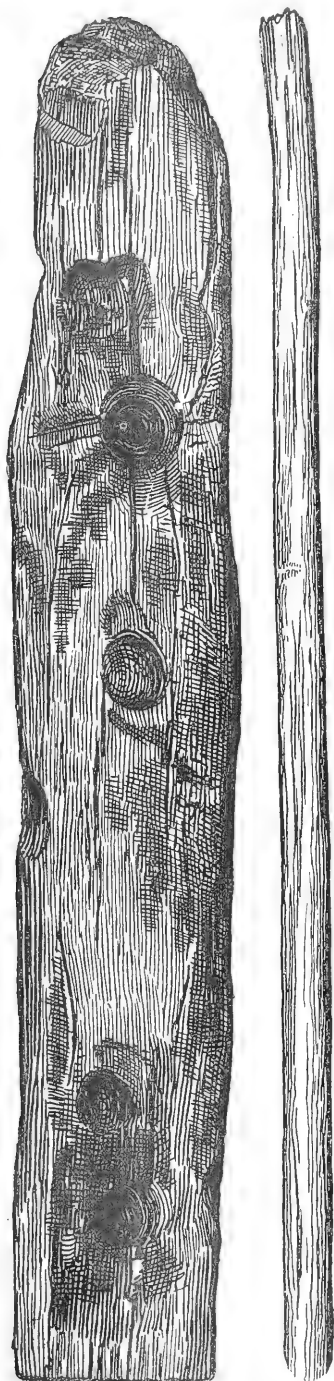


Fig. 10.

FIRE-MAKING SET.

(Cat. No. 15350, U. S. N. M. Natives of Talamanca, Costa Rica. Collected by Prof. W. M. Gabb.)

arrows or larger, is provided. Both ends of this are rounded, but one end is made smooth, the other is left slightly rough. The dried pith of some kind of reed, or more probably of the yucca, some fibers of the same loosely prepared like hackled flax, some powdered charcoal, I think formed by charring the yucca, and a piece of hard thick leather similar to sole leather, completes the outfit, which is carried in a leather bag made for the purpose. The first described piece of wood is placed upon the knees of the operator with a quantity of the fibrous substance beneath it which has been powdered with charcoal dust; some of the latter is put into one of the holes and the rough end of the stick inserted, the other end is put into an indentation of the leather placed under the chin, so that a gentle pressure may be exerted. The spindle is then rapidly revolved by rolling it one way and the other between the hands. The friction thus produced by the rubbing of the roughened surfaces ignites the fine coal dust, which, dropping as sparks of fire through the orifice at the bottom of the hole, falls into the dry fibrous preparation, thus igniting that, then by the breath blowing upon it a flame is produced and communicated to some fine dry wood and a fire is soon obtained. The whole operation occupies but a few minutes.

One of the rudest fire-making appliances in the Museum was collected by Prof. W. M. Gabb, at Talamanca, Costa Rica. The hearth is a rude billet of charred, black wood, resembling mahogany. It has central holes, with no gutter usually, though sometimes a shallow notch is cut on both sides of the fire-hole. The drill is a light branch, rather crooked, but dressed down roughly with a knife. Another hearth is of partly decayed, worm-eaten wood; with this a hard wood drill can be used, the hearth wasting away instead of the drill (fig. 16.) The absence of any fire slot, that is, the use of the central fire-hole, is worthy of notice in this locality. I have only observed its use in various parts of the Eskimo area, from East Greenland to Kadiak; outside of this range I have not noticed it anywhere else among the present tribes of the world. From de-

scriptions given it seems to have been practiced by the Caranchua Indians, a recently extinct tribe in Texas and Mexico. (See below.)

These specimens from Costa Rica are the crudest fire tools, not to be mere make shifts, that have come to my notice or have been described in the literature examined. The Costa Rican Indians are very interesting in their preservation of several other arts that may justly be classed among the most ancient. One may be mentioned, that of bark cloth making. Professor Gabb made quite a collection from Talamanea, but has not left any notes on these remarkable people, who are well worthy of the careful study of ethnologists.

A curious modification of this central hole plan is figured and described in Oviedo, folio 90, as occurring in Hispaniola; that is, the West Indies, Hayti, San Domingo, etc. He says that "two dry light sticks of brown wood were tied firmly together, and the point of the drill of a particular hard wood was inserted between the two and then worked." Mr. H. Ling Roth* thinks that if one can judge from the illustration (which is a miserable one) in Benzoni's work, the natives of Nicaragua also used three sticks in making fire. Benzoni, however, says: †

All over India they light fire with two pieces of wood; although they had a great deal of wax, they knew no use for it, and produced light from pieces of wild pine wood.

From Oviedo's description I am inclined to believe that the dust in which the fire starts was allowed to fall below on tinder placed beneath the hearth.

Through the kindness of Prof. F. W. Putnam, curator of the Peabody Museum, at Cambridge, Mass., I have received an extract from a manuscript written by Mrs. Alice W. Oliver, of Lynn, who, as a girl, in 1838 resided on Matagorda Bay, and learned the language and customs of the Caranchua Indians, a separate stock, now thought to be extinct.

Mrs. Oliver says:

After the hut is built a fire is made, the squaws usually begging fire or matches from the settlers, but, in case their fire is out and they have no other means of kindling it, they resort to the primitive method of producing it by friction of wood. They always carry their fire-sticks with them, keeping them carefully wrapped in several layers of skins tied up with thongs and made into a neat package; they are thus kept very dry, and as soon as the occasion for their use is over, they are immediately wrapped up again and laid away.

These sticks are two in number. One of them is held across the knees as they squat on the ground, and is about two feet long, made of a close-grained, brownish-yellow wood (perhaps pecan), half round in section; the flat face, which is held upward, is about an inch across. Three cylindrical holes about half an inch in diameter and of equal depth, the bottoms slightly concave, are made in it. The three holes are equally distant apart, about 2 inches, and the first one is the same distance from the end of the stick, which rests upon the right knee. In one of the holes is inserted the slightly-rounded end of a twirling stick made of a white, softer kind of wood, somewhat less than the diameter of the hole, so as to turn easily, and about 18 inches long.

* The Aborigines of Hispaniola. *J. Anthropol., Inst. Gt. Britain and Ireland*, xvi, p. 282.

† G. Benzoni.—*History of the New World*, Hakluyt Society, xxi, p. 151.

Holding the twirler vertically between the palms of the hands, a gentle but rapid alternating rotary motion is imparted. After continuing this for about five minutes the abrasion of the softer wood causes a fine, impalpable dust to collect in the hole, from which soon issues a thin, blue line of smoke.

As soon as the Indian sees this he quickly withdraws his twirler with one hand, while with the other he catches up and crushes a few dry leaves previously placed on a dry cloth close by (having been produced from thin wrappings, in which they have been preserved for this very purpose, to serve as tinder), and quickly but lightly sprinkles them in and around the hole, over which both hands are now held protectingly, the head bent down, and the incipient fire fanned to a blaze with the breath. As soon as the blaze has fairly caught, the stick and tinder are deftly turned over upon a little pile of dry twigs and leaves, got ready beforehand, and the fire is started.

This operation of getting fire is always performed by the men, and not by the squaws. The fire is invariably built in the center of the hut, upon the ground, and, is usually kept burning, for the Indians never slept regularly, but whenever they pleased, often asleep in the day time and awake nights, or *vice versa*, as they felt inclined.

The Iroquois are unique in America, and perhaps in the world, in making fire with the pump-drill. Several other tribes in America use the pump drill to pierce stone and shell, for which purpose it is an excellent tool, but the mechanical difficulties lying in the way of making fire with it have only been overcome by the Iroquois. Pump-drills are intended for light, fine work, with uniform, light pressure; hence, with little friction. The Iroquois have added this element by increasing the size of the balance-wheel and stock. Mr. Morgan, in his "League of the Iroquois," p. 381, figures a fire drill with a wooden stock 4 feet long and 1 inch in diameter. This stock has at the upper end a string and bow, while near the lower end is a "small wheel." Mr. Morgan says this is "an Indian invention of great antiquity."

Mr. J. N. B. Hewitt, of the Bureau of Ethnology, has kindly given the writer a set of apparatus and valuable information with reference to fire-making among the Iroquois, especially the Onondagas and Tuscaroras. He states that at times when there is disease among the people they say it is because the fire is "old." They then determine to make "new fire," so all fires are put out and two slippery-elm logs are selected and one of these is laid on the ground and a V-shaped notch is cut on the upper side. In this notch some tinder of dry slippery-elm is put and three (mystic or sacred number) men at either end work the other log backward and forward until fire is generated, and from this the fires are lighted. He believes that the new fire is made at the winter feast of the Iroquois. They say that the drill with the weight is their own invention. They use elm for that also. In making the pump-drill they sometimes cut an elm sapling and work out the drill, leaving the tap root for the fore part, the knot for the weight, and part of the stem for the top part of the drill.

It is not improbable that the Iroquois—the most advanced Indians in some respects on the continent, invented this use of the widely diffused pump-drill. It scarcely seems to be a practical way to make fire,

and, despite the assurances and belief of the Iroquois, is not very ancient, but was perhaps suggested by the white man. Indeed, Pere Lafitau, that keen and careful observer, in his "Moeurs des Sauvages Ameriquains," written in 1724, on page 242, gives a description of Indian fire-making that includes the Iroquois. He says:

The Hurons, the Iroquois, and the other peoples of North America do not make fire from the veins of flint, but rub two pieces of wood one against the other.

Then follows a description of fire-making, taken probably from the Iroquois, that is as good an account of the Indian apparatus and the way of working it as exists in the literature of the subject.

The drill was sufficient for its time for the reason that there was at that period rarely necessity for generating fire; the art of fire preservation was at its height.

The Cherokees, the most southerly of the Iroquois, Mr. James Mooney states, kept fire buried in the mounds upon which the council houses were built, so that if the house was destroyed by enemies the fire would remain there for a year or so. The Cherokees use the simple rotation apparatus, and, as far as Mr. Mooney can ascertain, never used the pump-drill. They have a tradition that fire originally came out of an old hollow sycamore tree (*Platanus occidentalis*).

Capt. John Smith tells how the Indians of Virginia made fire. He says:

Their fire they kindled presently by chafing a dry pointed sticke in a hole of a little square piece of wood, that firing itselfe, will so fire mosse, leaves, or anie such like drie thing that will quickly burn.*

Writing in the first quarter of the next century, Beverley says:

They rubbed Fire out of particular sorts of Wood (as the Ancients did out of the Ivy and Bays) by turning the end of a Piece that is soft and dry, like a Spindle on its Inke, by which it heats and at length burns; to this they put sometimes also rotten Wood and dry leaves to hasten the Work.†

Loskiel says of the Delawares:

Formerly they kindled fire by turning or twirling a dry stick, with great swiftness on a dry board, using both hands.‡

The Cherokees used for a drill the stalk of a composite plant (senecio), and twirled it on a piece of wood. The art has long been out of common use, but they employed the wooden drill to make fire for the Green Corn Dance into the present century, though flint and steel was then in vogue. Sometimes they passed the bow over drill. The tinder was of a fungus or dried moss. Mr. James Mooney collected this information from some of the older men of the tribe in North Carolina, who have retained the ancient customs and traditions, which the part of the tribe removed to the West has entirely lost.

The Creeks (Muskogean stock) had a regularly authorized fire-maker, who early in the morning made fire for the Green Corn Dance. The

* Smith.—The Natural Inhabitants of Virginia. English Scholars' Library. No. 16, p. 68.

† Beverley.—History of Virginia. 1722. 197, 198.

‡ Loskiel.—History of the Mission of the United Brethren, London, 1794. p. 54.

apparatus that he made use of was four sticks placed end to end to form a square cross. This was oriented, and at the junction of the sticks new fire was made by friction.*

The Choctaws (also Muskogean) of Mississippi, Mr. M. F. Berry writes, make fire in the following way: One stick of dry wood that has a hole in it, with a smaller hole at the bottom going through, is placed between the feet. Another piece made round and about 3 feet long is made to revolve rapidly back and forth between the hands in the hole, and the fire drops through the small hole below. When new fire was wanted for the Green Corn Dance, or other purposes, three men would place themselves so that each in turn could keep the stick revolving without a stop, until fire would drop down through the hole, which was nursed with dry material into a flame.

This form of the fire hearth is not represented in the collections of the Museum; the only other description of a process closely like it was given by Mr. Thomas C. Battey, who observed it among the Kiowas. It was shown him at that time as a revival of the ancient method (p. 543). The pierced fire hearth is somewhat impracticable, except in the Malay sawing method. In the rotary drill the small hole would come over the axis of least friction and heat. Unless provision was made for the dust to fall freely underneath by a double cone perforation worked from both sides the dust is likely to become obstructed and smother the fire. It will be seen, too, that it departs very much from the simplicity of the usual fire drill in the fact that a hole must be made through the piece of wood, a matter of some difficulty before the introduction of iron awls.

The Seminoles of Florida, the most Southern Muskoki, have neglected the art of fire making by simple friction, unless at the starting of the sacred fire for the Green Corn Dance, says Mr. Clay MacCauley.† A fire is now kindled either by the common matches, *ma-tci*, or by steel and flint.

Thus it is seen that wherever in the earlier period of the exploration in this country the observation has been made, the Indian, almost without exception, was found to be using the friction apparatus, consisting of two sticks of wood. Some tribes had improved on the working of the invention, while a very few others had perhaps arrived at the use of the higher invention of the flint and pyrites.

Returning to the tribes of the wide central plains of our country, we find that the flint and steel soon displaced the fire-sticks, except for religious purposes. The Mandans, of the great Siouan stock, were using flint and steel at the time of Mr. Catlin's visit in 1832.‡

There seems to be a great misapprehension among some of the writers

* Benj. Hawkins' Sketch of the Creek Country. 1798-'99. 68-72, cited in Pickett's History of Alabama. I, p. 108.

† Fifth Annual Report of the Bureau of Ethnology. 1883-'84, p. 518.

‡ The George Catlin Indian Gallery. Smithsonian Report. 1885. II, p. 456.

on ethnology, as to the general use of the bow-drill among the Indians. In mentioning that the Sioux use the bow-drill, Schoolcraft is quoted as authority. As a matter of fact the reference is to a "made-up" figure of a bow-drill set, marked "Dacota." On the same plate there is a representation of an Iroquois pump-drill that is obviously wrong. The lower part of the plate is taken up by a picture of an Indian woman (presumably Californian) pounding acorns in a mortar. To complete the absurdity the whole plate is entitled "Methods of obtaining fire by percussion," and is placed in the text of a *questionnaire* on the Californian Indians, opposite a description of the Californian way of making fire by twirling two sticks.*

Mr. Schoolcraft is not to blame for this state of affairs; in those days illustrations were not ethnological, they were "padding" gotten up by the artist. Nowhere in his great work does Mr. Schoolcraft describe either the Dacota or Iroquois drill. Among the northern Indians in central and northern Canada, however, the bow is used.

Sir Daniel Wilson, in his work on Prehistoric Man, notes that the Red Indians of Canada use the drill bow. In August, 1888, at the meeting of the American association, at Toronto, he gave an account of the facility with which these Indians make fire. He said that at Nipissing, on the north shore of Lake Superior, while he was traveling in a pouring rain, and not having the means wherewith to light a fire, an Indian volunteered to light one. He searched around for a pine knot and for tinder, rubbed up the soft inner bark of the birch between the hands, got a stick from a sheltered place, made a socket in the knot and another piece of wood for a rest for the drill, tied a thong to a piece of a branch for a bow. He put the tinder in the hole and rested his breast on the drill and revolved it with the bow and quickly made fire.

It is perhaps true that some of the Dacotas did use the bow at times, but it is not correct to place it as the customary tool of the whole stock. On the contrary, there is evidence that they used the simple means. Dr. J. Owen Dorsey writes:

I was told in 1879 by the late Joseph La Flèche, that the Omahas, prior to the advent of the white men, made fire by using pieces of the "du-à-du-á-hi," a grass (?) that grows in the Sand Hill region of Nebraska, near the sources of the Elkhorn River. One piece was placed horizontally on the ground, and a slight notch was cut at one end, wherein a few grains of sand were put. The other stick was held between the palms of the hands, with one end in the notch of the horizontal stick, and then rolled first in one direction then in the other till fire was produced. A fresh notch was made in the first stick whenever the old one became useless, and so on until it became necessary to procure a new stick.

In the Green Corn Dance of the Minitaries, another Siouan tribe, the "corn is boiled on the fire, which is then put out by removing it with the ashes and burying them. New fire is made by desperate and painful exertion, by three men seated on the ground facing each other and violently drilling the end of a stick into a hard block of wood by roll-

* Schoolcraft.—Indian Tribes. 1851-60. III, Pl. 28.

ing it between the hands, each one catching it in turn from the others without allowing the motion to stop until smoke, and at last a spark of fire is seen and caught in a piece of spunk, when there is great rejoicing in the crowd.* The desperate exertion was not necessary, except in imitation of the Zuñi fashion of wetting the drill to create sacred fire.

It will be seen from these references given that the Sioux used the customary Indian method. Later, they may have used the bow to expedite the drill when the wood was intractable. The bow may have been borrowed from more northern tribes, the Algonquians are said to use it;† Mr. Thomas C. Battey says that the Sac-Fox Indians (Algonquian stock) used a soft wood drill and a hard wood hearth. "The drill was worked by a bow and the fire caught on the end of the drill and touched to tinder."

Throughout South America the art of fire-making with two sticks of wood is found to be as thoroughly diffused as it is in North America. Many of the tribes still use it; we may say that in all tribes the use of flint and steel was preceded by that of the sticks of wood.

The Guanchos, a mixed tribe of herders on the Pampas of Venezuela, practice a peculiar way of fire-getting. They select a pliant rod, place one end against the breast and the other against the block forming the hearth, *held on a line with the breast*. By pressing against the rod it is bent and turned rapidly around like an auger. This impracticable and no doubt very local method is described by Prof. E. B. Tylor.‡

In Brazil, in the Province of Goyaz, the Chavantes, Cayapós, and Angaytés, use the simple fire drill.§ The Angaytés drill figured looks somewhat like that of the Mokis. It is usually 28^{cm}. long for the hearth, and for the drill 20^{cm}. They use the throat skin of the Nandu, *Rhea Americana*, for a tinder sack. The Lenguas of the same province use a strike a-light consisting of a tinder horn; flint, and steel, which is also figured in the cited report. This set is very interesting, because from it we can say with certainty where the Lengua got it. The steel is the English "flourish," and the flint is the oval, old English shape, probably broken somewhat by blows. The Lenguas, being on the line of travel, have adopted the method from English traders. In Rio Janeiro the Indians had an angular recess at the back of their snuff mills for the purpose of making fire by friction.||

The Ainos of Japan formerly used fire-sticks, and are said even yet to resort to this method when they have no other means of getting fire. They use also flint and steel, adopted from the Japanese. A specimen (No. 22257) is figured and described on page 583 of this paper. The fire-

* Smithsonian Report. 1885. II, p. 315.

† Sir Daniel Wilson.—Prehistoric Man. II, p. 375.

‡ Darwin.—Narrative of the voyage of the Beagle. III, p. 458. Cited in Early History of Mankind. p. 241.

§ Dr. Emil Hassler.—In Jahrbuch Mittelschweiz. Commercial. Gesellsch. Arau, Zweiter Band. 1888. 114, 115.

|| Harper's Monthly Magazine. Nov. 1853. VII, p. 745.

sticks of the Ainos of Yezo (No. 129970, fig. 17) were loaned to the Museum by Prof. F. W. Putnam, who also secured the following letter of Mr. D. P. Penhallow, who collected the sticks:

At our request the chief brought several fire-sticks to my house, together with the necessary number of men to get fire in the approved style. Upon examination the sticks were found to be from 6 to 9 inches long, and very dry. Our informant stated that they were from the root of the elm *Ulmus campestris*, var. *lævis*, and that it was customary to keep a supply ahead, as the sticks require to be seasoned for about one year, by hanging them from the rafters of the house above the fire. To prepare them for the process of making fire, a shorter stick was cut flat on opposite sides, and about midway of one of the flattened sides a small hole was made with the point of the knife for the purpose of establishing the center of action. Another stick about 9 inches long was then well sharpened at one end. Three men now seated themselves in a circle, facing inward, with the flattened stick notched side uppermost in the center.

The point of the long stick was now placed in the notch, and with the stick in a vertical position and grasped between the extended palms of the hands, a steady and somewhat fast rotating pressure was brought to bear, exactly as in the use of the old-fashioned awl. As soon as the first man became weary, the second brought his hands to bear upon the upper end of the stick, and continued the motion without allowing it to cease. This was repeated as often as necessary until fire was obtained. Owing to the very dry character of the sticks used, the parts in contact rapidly wear away, so that the notch quickly becomes cup-shaped, and the pointed end is correspondingly rounded, while at the same time the powdery product is thrown out, forming a raised ring on all sides. Before long it is observed that the powder acquires a brownish tinge. This gradually deepens as the temperature rises until finally a delicate line of smoke warns the operator that the end is near.

The motion is now continued until the smoke is well established, when the vertical stick is raised, disclosing a spark on its end. The mouth is applied to the opposite extremity, and by means of a few vigorous pulls as if smoking a cigar, owing to the porous nature of the stick, the spark is drawn into a flame.

The actual operation as witnessed by us consumed about two hours, and the Ainos state that the process requires from one and one-half to two and one-half hours.

The sticks figured are the actual ones that were used in the operation above described.

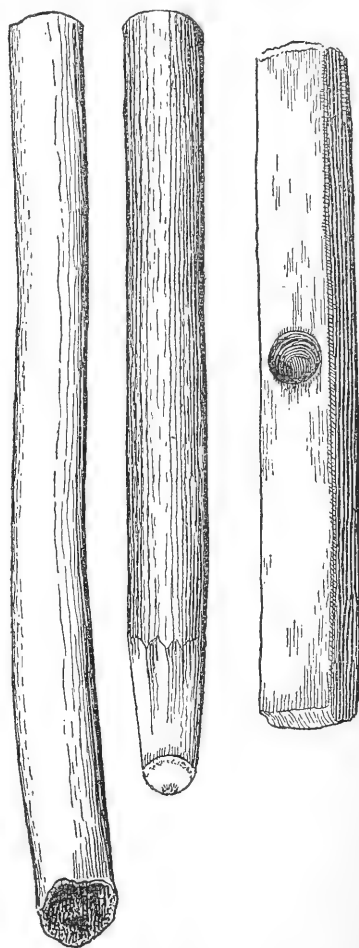


Fig. 17.

FIRE-MAKING SET WITH TOUCHWOOD.

(Cat. No. 129970, U. S. N. M. Ainos of Yezo, Japan. Collected by D. P. Penhallow. Lent by Peabody Museum, through Prof. F. W. Putnam.)

The Japanese formerly used the simple drill; a few are yet preserved in the temples. Under the name of "Sacred fire drill" it is described* as a board 1 foot wide, 1 foot 4 inches long, 1 inch thick, and with a step 1 inch wide or over on one edge. It has holes and grooves like the Eskimo hearth. The drill is a stick twirled between the hands. The parts are of the *hi-no-ki*, or fire tree, *Chamæocyparis obtusa*. The drill is called *hi-kiri-usu*, or fire drilling mortar. It was and perhaps is yet used for the purpose of drilling fire at the four corners of the temple inclosure to ward off the calamity of fire. They are said also to have used the *rokuro*, or pump-drill. It is interesting to note that the Japanese carpenter's drill with the iron point is rotated between the palms. They are still in use. The one figured is in the Tokio Museum.

Prof. Romyn Hitchcock has kindly allowed a drawing to be made of a photograph which he procured of a sacred fire drill preserved in the temple called Oyashiro, at Idzumo, Japan (fig. 18). The hearth of

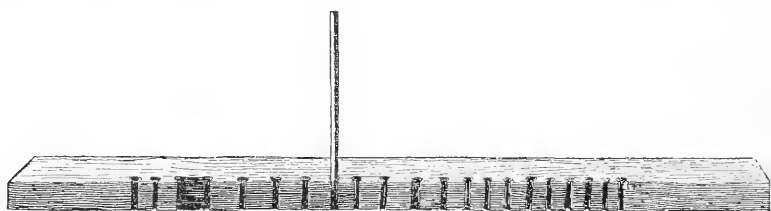


Fig. 18.

SACRED FIRE DRILL.

From photograph of specimen in Tokio Museum. Lent by Romyn Hitchcock.

this set is made of *hi-no-ki* wood and the drill of the *Ut-su-gi*, *Deutzia scabra*.

Professor Hitchcock says:

The fire drill is used at the festivals of the Oyashiro to produce fire for use in cooking the food offered to the gods. Until the temple was examined officially in 1872, the head priest used it for preparing his private meals at all times. Since then it has been used only at festivals and in the head priest's house on the eve of festivals, when he purifies himself for their celebration in the *Imbidous*, or room for preparing holy fire, where he makes the fire and prepares the food.

The art of fire-making by sticks of wood by the method of rotation is, or has been, as far as we know, universal on the African continent as it was in the two Americas at the time of the discovery. There is not a clue as to how the ancient Egyptians generated fire.

The Somalis are a pastoral people of Arab extraction, inhabiting a large maritime country south of the Gulf of Aden. Their fire-sticks (fig. 19) are pieces of branches of brownish wood of equal texture, in fact the hearth has formerly been used as a drill, as may be seen by its regularly-formed and charred end. This is another proof that it is not necessary that the sticks should be of different degrees of hardness. The grain of the wood, that of the drill being against and the hearth

* Trans. Asiat. Soc. Japan. 1878, vi. Pt. II, p. 223.

with the grain, in effect accomplishes what the use of wood of different qualities results in. The hearth and drill are in the neighborhood of 12 inches long, the former with a diameter of three-eighths of an inch and the latter one-fourth of an inch. They were collected by Dr. Charles Pickering in 1843.

It is possible that the Somalis may have carried this method with them from Arabia. They conquered this coast, driving back the earlier tribes inhabiting the country in the early part of the fifteenth century. Long since that time, and even now, some Arab tribes practice the drilling of wooden sticks to produce fire.

In eastern equatorial Africa the Wataveita, says Mr. H. H. Johnston, generate fire in the common African way by rapidly drilling a hard-pointed stick into a small hole in a flat piece of wood. An interesting bit of custom comes out in connection with this art among the people. "It is the exclusive privilege of the men, and the secret is handed down from father to son, and never under any conditions (as they say) revealed to women." I asked



Fig. 19.

FIRE-MAKING SET.
(Cat. No. 129971, U. S. N. M. Somalis, E. Africa. Collected by Dr. Charles Pickering. Lent by Peabody Museum through Prof. F. W. Putnam.)

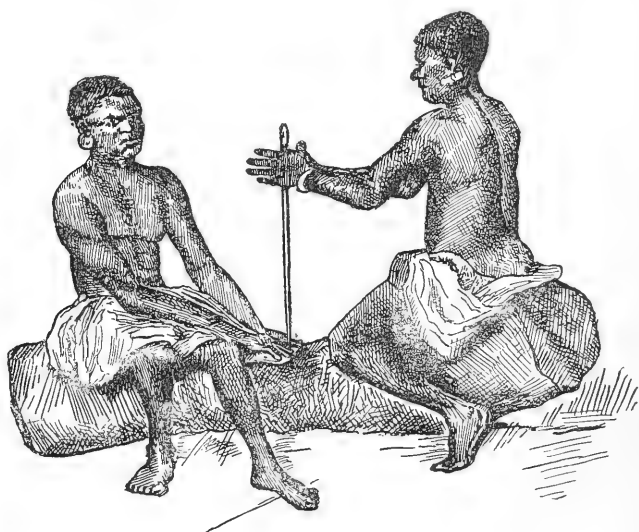


Fig. 20.

TAVEITA AFRICANS MAKING FIRE.

After H. H. Johnston. (See Jour. Soc. Arts, June 24, 1887.)

one man why that was. "Oh," he said, "if women knew how to make fire they would become our masters."* The figure (fig. 20) shows how this people of the great Bantu stock make fire; this tribe visited by Mr. Johnston lives on the slopes of the beautiful Kilimanjaro Mountain.

* J. Anthrop. Inst. Great Britain and Ireland. 1885. xv, p. 10.

Mr. R. W. Felkin*, in a study of the Maidu or Moru negroes of Central Africa, 5° north latitude, 30° 20' east longitude, describes the fire-making of that tribe. He says that one piece of wood about the size and shape of a large pencil is rotated in a hole in a flat piece of hard wood. One man holds the wood steady whilst two others take it in turn to rotate the stick. This article of Mr. Felkin's is commended to ethnologists as a model ethnologic study in method and research.

That veteran and renowned explorer, Dr. Schweinfurth, gives the following:

The method of obtaining fire, practiced alike by the natives of the Nile lands and of the adjacent country in the Welle system, consists simply in rubbing together two hard sticks at right-angles to one another till a spark is emitted. The hard twigs of the *Anona senegalensis* are usually selected for the purpose. Underneath them is placed either a stone or something upon which a little pile of embers has been laid; the friction of the upper piece of wood wears a hole in the lower, and soon a spark is caught by the ashes and is fanned into a flame with dry grass, which is swung to and fro to cause a draught, the whole proceeding being a marvel which might well-nigh eclipse the magic of my lucifer matches.†

Kaffir fire-making is described in some detail in the following:

The Kaffir blacksmith never need trouble himself about the means of obtaining a fire. Should he set up his forge in the vicinity of a Kraal, the simplest plan is to send his assistant for a fire-brand from one of the huts. But if he should prefer, as is often the case, to work at some distance from the huts, he can procure fire with perfect certainty, though not without some labor. He first procures two sticks, one of them taken from a soft-wood tree and the other from an acacia or some other tree that furnishes a hard wood. Of course both sticks must be thoroughly dry, a condition about which there is little difficulty in so hot a climate. His next care is to shape one end of the hard stick into a point and to bore a small hole in the middle of the soft stick. He now squats down * * * places the pointed tip of the hard stick in the hole of the soft stick, and, taking the former between his hands, twirls it backwards and forwards with extreme rapidity. As he goes on the hole becomes enlarged and a small quantity of very fine dust falls into it, being rubbed away by the friction. Presently the dust is seen to darken in color, then to become nearly black, and presently a very slight smoke is seen to rise. The Kaffir now redoubles his efforts; he aids the effect of the revolving stick by his breath, and in a few more seconds the dust bursts into a flame. The exertion required by this operation is very severe, and by the time the fire manifests itself the producer is bathed in perspiration.

Usually two men at least take part in fire-making, and by dividing the labor very much shorten the process. It is evident that if the perpendicular stick be thus worked, the hands must gradually slide down until they reach the point. The solitary Kaffir would then be obliged to stop the stick, shift his hands to the top, and begin again, thus losing much valuable time. But when two Kaffirs unite in fire-making, one sits opposite the other, and as soon as he sees that his comrade's hands have nearly worked themselves down to the bottom of the stick he places his own hands on the top, continues the movement, and relieves his friend. Thus the movement of the stick is never checked for a moment, and the operation is consequently hastened. Moreover, considerable assistance is given by the second Kaffir keeping the dust properly arranged round the point of the stick and by taking the part of the bellows, so as to allow his comrade to expend all his strength in twirling.‡

* Proc. Royal Soc. Edinburgh. Session of 1883-'84. p. 309.

† Schweinfurth.—The Heart of Africa. New York, 1874. I, 531, 532.

‡ J. G. Wood.—The Natural History of Man. I, p. 101.

It is an anomaly that the African, to light the fire to smelt the iron out of which he forges his remarkable weapons, should use sticks of wood.

2. ESKIMO FOUR-PART APPARATUS.

The arts of the Eskimo yield more satisfactory results to students of comparative ethnology than those of any other people.

In all their range the culture is uniform; one finds this fact forced upon his observation who has examined the series of specimens in the National Museum, where they are arranged in order by localities from Labrador to southern Alaska. Prof. Otis T. Mason's paper on Eskimo throwing-sticks* gave a new interpretation to this fact and powerfully forwarded the study of ethnology by showing the classificatory value of the distribution of an art.

Professor Mason points out that though the Eskimo culture is uniform in general, in particular the arts show the modification wrought by surroundings and isolation—tribal individuality, it may be called—and admit of the arrangement of this people into a number of groups that have been subjected to these influences.

The Eskimo fire-making tools in the Museum admit of an ethnographic arrangement, but in this paper it is not found necessary to make a close study of this kind. From every locality whence the Museum possesses a complete typical set, it has been figured and described.

The Eskimo are not singular in using a four-part apparatus, but are singular in the method of using it. The mouth-piece is the peculiar feature that is found nowhere else.

The drilling and fire-making set consists of four parts, viz:

The mouth-piece,—sometimes a mere block of wood, ivory, or even the simple concave vertebra of a fish, or the astragalus of a caribou. More often, they show great skill and care in their workmanship, being carved with truth to resemble bear, seals, whales, and walrus. The seal is the most common subject. The upper part is almost always worked out into a block, forming a grip for the teeth. The extent to which some of these are chewed attests the power of the Eskimo jaw. Frequently the piece is intended to be held in the hand, or in both hands, hence it has no teeth grip. In the under part is set a piece of stone, in which is hollowed out a cup-shaped cavity to hold the head of the drill. These stones seem to be selected as much for their appearance as for their anti-friction qualities. They use beautifully-mottled stone, marble, obsidian, and ringed concretions.

The drill is always a short spindle, thicker than any other drill in the world. It is frequently of the same kind of wood as the hearth.

The thong is the usual accompaniment of the fire drill. It is rawhide of seal or other animals. The handles have a primitive appearance; they are nearly always made of bears' teeth, hollow bones, or

* Mason.—Throwing-sticks in the National Museum. Smithsonian Report. 1884. II, p. 279.

bits of wood. Sometimes handles are dispensed with. Mr. Warren K. Moorhead found some perforated teeth in an Ohio mound that in every respect resemble the Eskimo cord handles. They have also been found in caves in Europe decorated with concentric circles like those on the Eskimo specimens.

The bows are among the most striking specimens from this people. They are pared down with great waste from the tusks of the walrus, taking the graceful curve of the tusk. The Museum possesses one 24½ inches long. It is on their decoration that the Eskimo lavishes his utmost art. The bow does not lend itself well to sculpture, as does the mouth-piece; so he covers the smooth ivory with the most graphic and truthful engravings of scenes in the active hunting life in the Arctic, or he tallies on it the pictures of the reindeer, whales, seals, and other animals that he has killed.

Professor Baird was interested more with these bows than with any other Eskimo products, and desired to have them figured and studied.

The distribution of the bow is remarkable. It is not found south of Norton Sound, but extends north and east as far as the Eskimo range. The Chukchis use it,* but the Ostyaks use the ancient breast drill.†

The bow is used by individuals in boring holes. It is presumed that its use as a fire-making tool is secondary, the cord and handles being the older. The difficulty of making fire is greatly increased when one man attempts to make it with the compound drill; at the critical moment the dust will fail to ignite; besides, there is no need of one man making fire; a thing that is for the common good will be shared by all. Hence the cord with handles, which usually requires that two men should work at the drill, is as a rule used by the Eskimo.

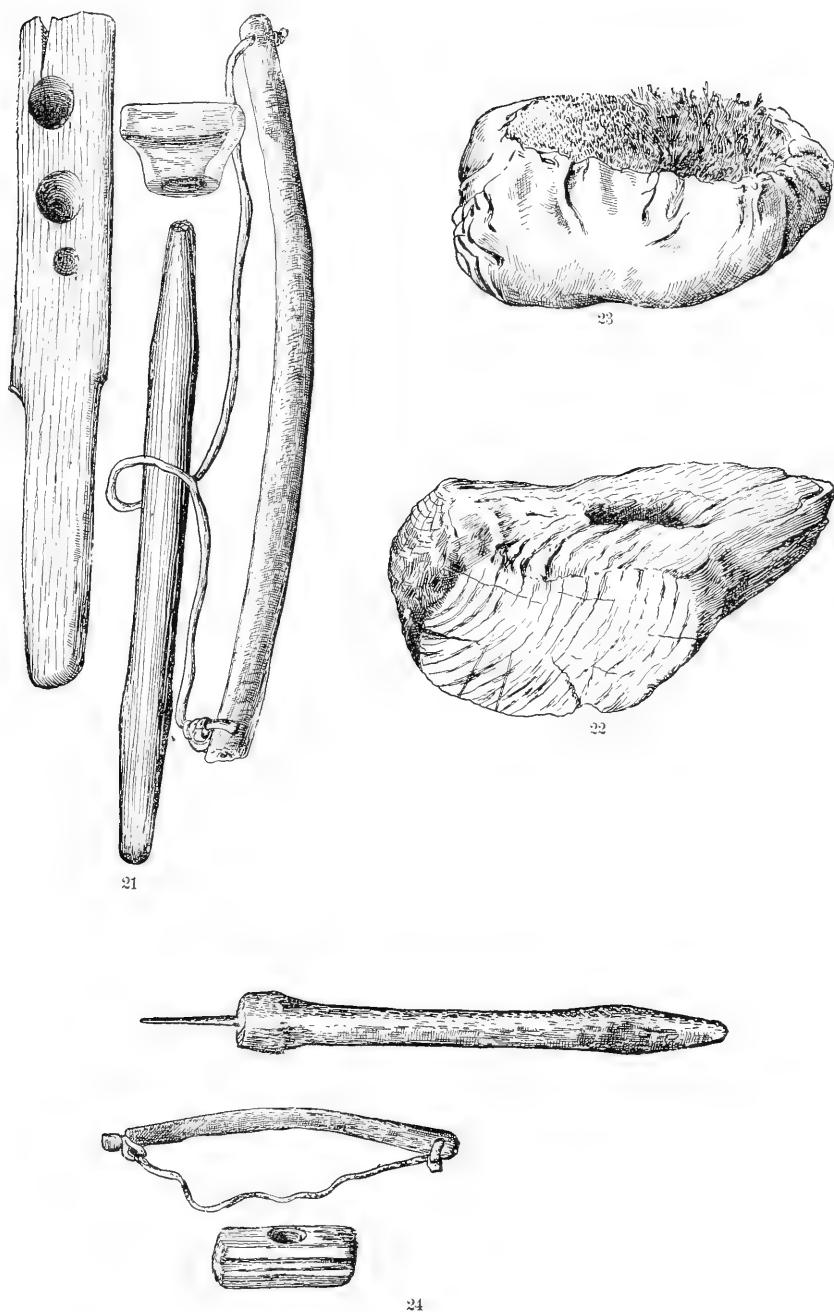
Though the Sioux, and some other North American tribes, made use of the bow to increase the speed of the drill, they did not use the thong with handles, nor was the bow common even in tribes of the Siouan stock that had attained to its use (see remarks p. 549). The bow may be termed a more advanced invention, allowing one man with ease to bore holes.

The hearth is made of any suitable wood. It is commonly stepped and has slots. The central hole with groove is also found. These hearths are preserved carefully, and fire has been made on some of them many times.

The distribution of the central-hole hearth (see fig. 21, pl. LXXIV), and the slot-and-step hearth (see fig. 36), is rather striking. The central holes are found in the specimens observed from the north coast of Alaska, Insular British America, and Greenland, exclusively. The stepped hearth with edge holes and slots is by far the more common in western Alaska, though the other method crops out occasionally; both ways are sometimes used in the same tribe. More often, the central holes are bored

* Nordenskiöld.—*Voyage of the Vega*. London, 1881. II, p. 121.

† Seebohm.—*Siberia in Asia*. p. 109.



Figs. 21, 22. FIRE-MAKING SET AND EXTRA HEARTH. Cat. No. 10258, U. S. N. M. Frobisher Bay. Collected by Capt. C. F. Hall.

Fig. 23. MOSS IN A LEATHERN CASE. Cat. No. 10191, U. S. N. M. Collected by Capt. C. F. Hall.

Fig. 24. BORING-SET. Cat. No. 34114, U. S. N. M. Cumberland Gulf. Collected by L. Kumlein.

on a groove (fig. 34), which collects the ground-off particles and facilitates ignition. Rarely fire is made by working the drill on a plane surface, in single, non-connecting holes.

The difference between these features is, that it is found to be more difficult to get fire by a single hole without groove, or slot, than when the latter features are added. The powder forms a ring around the edge of the hole, is liable to be dispersed, and does not get together in sufficient amount to reach the requisite heat for ignition. Of course this is obviated when a second hole is bored connecting with the first, when the latter becomes a receptacle for the powder.

It is found that these different ways are due to environmental modification, showing itself as remarkably in fire-making, as in any other Eskimo art. Both the stepped and central-hole hearth are different devices for the same end. The step on the hearth is to keep the pellet of glowing powder from falling off into the snow, so universal in Eskimo-land; hence, the simple hearth of primitive times and peoples of warmer climates has received this addition. The same reason caused the Eskimo to bore the holes in the middle of the block.

By following the distribution of the center hole method, a clew may perhaps be gotten to the migrations of the Eskimo.

From Labrador to Norton Sound, by the collections in the Museum, the center hole is alone used; south of Norton Sound both methods prevail, with a preponderance of the stepped-hearth species. The step seems to be an addition to the Indian hearth; the center is an independent invention.

The operation of the drill is well told in the oft-quoted description by Sir. E. Belcher. The writer can attest to the additional statement, that the teeth of civilized man can scarcely stand the shock. He says:

The thong of the drill bow being passed twice around the drill, the upper end is steadied by a mouth-piece of wood, having a piece of the same stone imbedded, with a counter-sunk cavity. This, held firmly between the teeth, directs the tool. Any workman would be astonished at the performance of this tool on ivory; but having once tried it myself, I found the jar or vibration on the jaws, head, and brain, quite enough to prevent my repeating it." *

The ethnographical study of the Eskimo fire-drill begins with Labrador, including Greenland and following the distribution of the people among the islands and around the North American coast to Kadiak Island and the Aleutian chain. The following is an interesting account from Labrador, showing what a man would do in the exigency:

He cut a stout stick from a neighboring larch, and taking out the leather thong with which his moccasins were tied, made a short bow and strung it. He then searched for a piece of dry wood, and having found it, cut it into shape, sharpened both ends, and twisted it once around the bowstring; he then took a bit of fungus from his pocket and put it into a little hole which he made in another dry piece of wood with the point of the knife. A third piece of dry wood was fashioned into a handle for his drill.†

* Trans. Ethnol. Soc. London, 1861. p. 140,

† Hind,—Labrador. I, p. 149,

Eskimo in other localities often use such make-shifts. Cup cavities are often observed in the handles of knives and other bone and ivory tools where they have used them for heads or the fire-drill.

Cumberland Gulf is the next locality to the northward. There are several specimens in the collection from this part of Baffin Land, procured by the famous explorer, Captain Hall, and the less known, but equally indefatigable Kumlein. The fire-making implements from Cumberland Gulf have a markedly different appearance from those of any other locality in the Eskimo area. They have a crude look, and there is a paucity of ornamentation unusual among this people. The drill bow is one of the things which the Eskimo usually decorates, but these bows have not even a scratch.

It can be inferred that in Baffin Land, more unfavorable conditions prevail than in southern Alaska. It must be this cause coupled with poor food supply, that have conspired to make them the most wretched of the Eskimo.

The hearth (fig. 21, pl. LXXIV) is of drift oak. It was collected at Frobisher Bay by Capt. Charles F. Hall. It has central holes, and appears to be very unfavorable wood for fire-making. The block hearth is also from Frobisher Bay (fig. 22, pl. LXXIV). It is an old piece of hemlock, with two central communicating holes. The mouth-piece is a block of ivory. Another mouth-piece is a bit of hard wood soaked in oil; it was used with a bone drill having an iron point. A very small, rude bow goes with this set (fig. 24).

Our knowledge of eastern Greenland has been very much increased

by the explorations of Holm and Garde, who reached a village on the east coast never before visited by a white man. Extensive collections were made, both of information and specimens. In reference to fire-making, Mr. Holm reports :

"They make fire by turning a hard stick, of which the socket end is dipped in train oil, very rapidly around by means of a sealskin thong with handles. This stick is fixed at one end into a head set

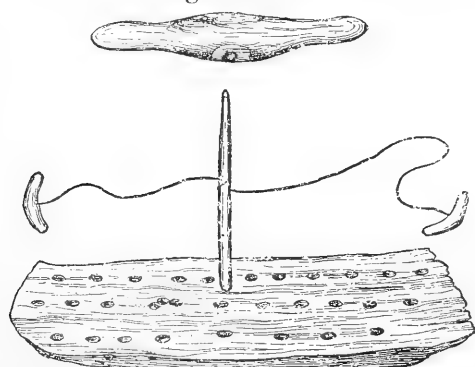


Fig 25.

FIRE-MAKING SET.

(Angmagsalik Eskimo, E. Greenland. Copied from G. Holm's *Ethnologisk af Angmagsalikerne*, 1887.)

with bone, and the other end is pressed down into a cavity on the lower piece of wood (fig. 25). Therefore there must be two persons in order to make a fire. One turns the drill with the cord, while the other presses it down on the hearth; both support the block with their feet. As soon as the dust begins to burn they fan it with the hand. When it is ignited, they take it and put it into dried moss (*sphagnum*), blow it, and soon get a blaze. In this way they make a fire in an incredibly short time."*

*Danish Umiak Expedition to Eastern Greenland, 1888. p. 28. Plate XIV contains the figure.

In the preliminary report, Mr. Holm gives the time at almost less than half a minute. It was made by the Eskimo, Illinguaki, and his wife, who, on being presented with a box of matches, gave up their drill, saying that they had no farther use for it.

In the same report Mr. Holm gives an interesting note. He says:

This fire apparatus is certainly better developed than that which has been described and drawn by Nordenskiöld from the Chukchis (*Voy. of the Vega*, II, p. 126). The principle is the same as the Greenlander's drill, which they employ for making holes in wood and bone, and which is furnished with a bow and mouth-piece.* (fig. 26.)

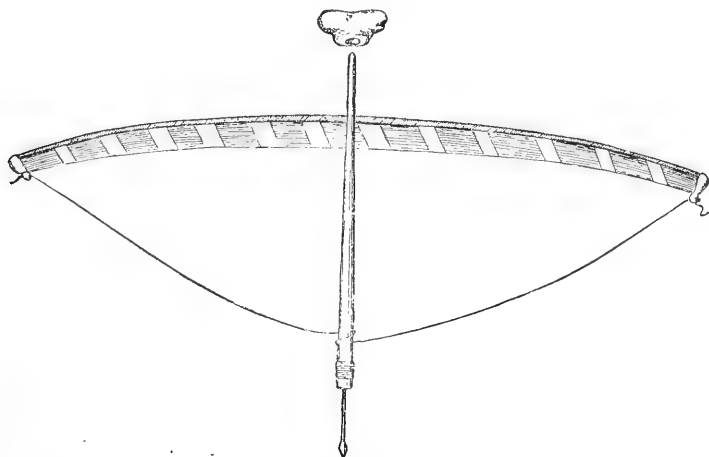


Fig. 26.
BORING SET.

(Augmagsalik Eskimo, E. Greenland. G. Holm's *Ethnographik of Angmagsalikerne*.)

The central holes of this hearth are worthy of note, occurring in the farthest eastern locality of the Eskimo, and in Labrador.

Western Greenland.—The material in the Museum from western Greenland is very scanty. The southern coast has been settled for so long a time that the Eskimo and many of their arts have almost become extinct. No view of fire-making in Greenland would be complete without Davis's quaint description of it, made three hundred years ago, but it was the upper end of the spindle that was wet in Trane. A Greenlander "begaune to kindle a fire in this manner: He tooke a piece of a boord wherein was a hole half thorow; into that hole he puts the end of a round sticke like unto a bedstaffe, wetting the end thereof in Trane, and in a fashion of a turner with a piece of lether, by his violent motion doeth very speedily produce fire."†

Eskimo graves and village sites yield evidence also that the fire-making tools were not different from those at present used higher north along the coast, and on the east coast.

* Danish Umiak Expedition. Preliminary Report, p. 208. This seems scarcely what would be inferred from the development of these inventions.

† Hakluyt Society. III, p. 104.

Dr. Bessels, speaking of Itah Eskimo of Foulke Fiord in Smith Sound, says: "The catkins of the arctic willow are used as tinder to catch the sparks produced by grinding two pieces of stone. Also the widely diffused 'fire-drill' is found here; the spindle is held between a piece of bone and a fragment of semi-decayed wood, and is set in motion by the well-known bow, and is turned until the wood begins to ignite."*

The "fire-bag" is an accompaniment to all sorts of fire-making apparatus. The fire-bag shown (fig. 27, pl. LXXV) was collected by Captain Hall, at Holsteinberg, western Greenland in 1860. It is made of sealskin, and is a good specimen of the excellent needlework of these Eskimo. It was used to carry, more especially, the fire-drill and tinder which require to be kept very dry.

There is a wide gap in the collections of the Museum between the locality of the specimen just mentioned, and the fire hearth from the Mackenzie River (fig. 28). This specimen is from Fort Simpson presumably, where B. R. Ross collected. It is said to be difficult to discriminate the Eskimo from the Indian on the lower Mackenzie. This hearth may be Indian, as it has that appearance; besides, no Eskimo hearth yet observed has side holes and slots like this without the step. The Indians of this region are of the great Athapascan stock of the North. The close resemblance of this stick to the one from the Washoans of Nevada has been commented upon. (See fig. 6, p. 537.)

There is also a very fine old central-hole hearth from the Mackenzie River, collected also by Mr. Ross. It is a rough billet of branch wood, cut apparently with an axe, or hatchet (fig. 29). It is semi-decayed and worm-eaten. It has ten central holes where fire has been made; they are quite deep, forming a gutter in the middle of the hearth. There is, as can be seen, no need of a groove, as the dust falls over into the next hole, collects in a mass, and ignites.



Fig. 28.

LOWER PART OF
FIRE-MAKING SET
(on one end is gum
for cement).

(Cat. No. 1978, U. S. N. M.
Mackenzie River, B. C.
Collected by B. R. Ross.)

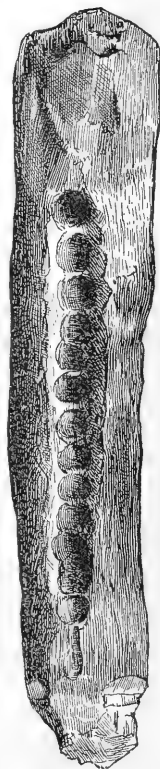


Fig. 29.

LOWER PART OF
FIRE-MAKING SET.

(Cat. No. 1963, U. S. N. M.
Eskimo of Mackenzie
River, B. C. Collected
by B. R. Ross.)

* Die amerikanische Nordpol-Expedition.
Leipzig. p. 358.

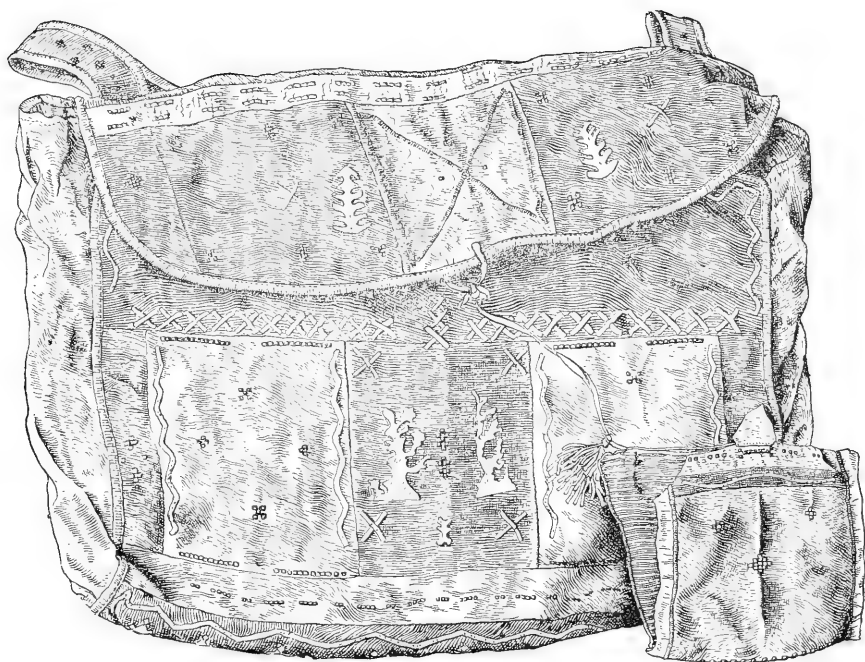


Fig. 27. FIRE-BAG. Cat. No. 10128, U. S. N. M. Eskimo of Holsteinberg, West Greenland. Collected by Capt. C. F. Hall.

The Anderson River set is a very complete and interesting outfit. It was collected many years ago by C. P. Gaudet. The parts are small for convenience of carrying. It is the custom of those who live in snow-covered regions to wrap the drill and hearth together very carefully to keep them dry, as these are the essential parts of the apparatus. It does not matter about the mouth-piece or bow. In this example there is a groove cut along the bottom of the hearth in order to facilitate tying the drill and hearth securely together. The hearth is a square block of soft wood with three central holes (fig. 30).

The other parts of this set are also worthy of consideration. The mouth-piece is set with a square piece of black stone. The part held in the mouth is very much chewed. One of the wings has a hole for tying, as has the hearth.

This is an usual Eskimo precaution to prevent small objects from being lost in the snow. The drill is short, being only 7 inches long. The bow is the fibula of a deer, pierced at each end for the frayed thong of sealskin. It has a primitive look, but it admirably serves its purpose.

The Point Barrow set was collected by the most successful expedition under charge of Lieut. P. H. Ray, U. S. Army. The knuckle-bone of a deer serves as a mouth-piece, the cup cavity and its general shape fitting it for the purpose admirably.

The drill is regularly made of light pine wood; it is slightly smaller in the middle. The hearth is a rudely rounded piece of pine. A fragment has been split off, and on this surface a groove has been cut and three fire-holes bored along it. The thong is without handles; it is used to tie the parts together when they are not in

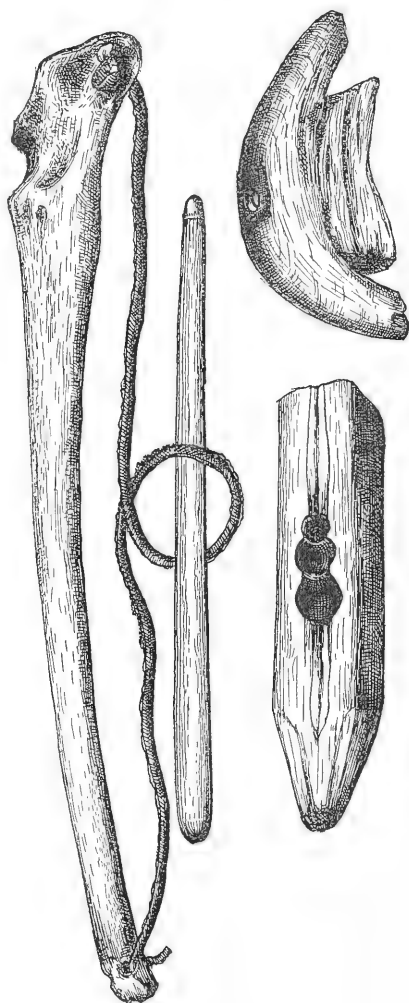


Fig. 30.

FIRE-MAKING SET.

(Cat. No. 1327 U. S. N. M. Eskimo of Anderson River, B. C. Collected by C. P. Gaudet.)

use. A bunch of willow twigs, the down of which is used as tinder, is also shown (fig. 31).

This set is especially interesting, because it shows the degeneration of an art. The fire-drill is so rarely used at Point Barrow, Mr. John Murdoch says, that it was not possible to get a full set devoted to that purpose. Those here shown are a make-shift. The method only survives by the conservatism of a few old men of the tribe, who still cling to old usages. One of these made the drill for Lieutenant Ray, telling him that it was the kind used in old times. It seems primitive enough; the knuckle-bone might well have been the first mouth-piece. The Eskimo farther east sometimes use a fish vertebra for the same purpose; one from the Anderson River has this. The cord without handles is undoubtedly the earliest form also.

The small wooden and bone mouth-pieces of the Eskimo east of Point Barrow to Cumberland Gulf seem to be copies of the deer knuckle-bone. Another primitive adaptation is found in an Anderson River bow, which is made of the fibula of a deer (see fig. 30).

The fire-making drill collected from the Chukchis by the *Vega* expedition in the Cape Wankarem region, in northeastern Siberia, about the same latitude as Point Barrow, is figured in Nordenskiöld's Report.* It is worked by a bow, and the drill turns in a mouth-piece of a deer astragalus like the Point Barrow specimen. The block has central holes, with short grooves running into each one.

Nordenskiöld's description of the manner of making fire is very de-

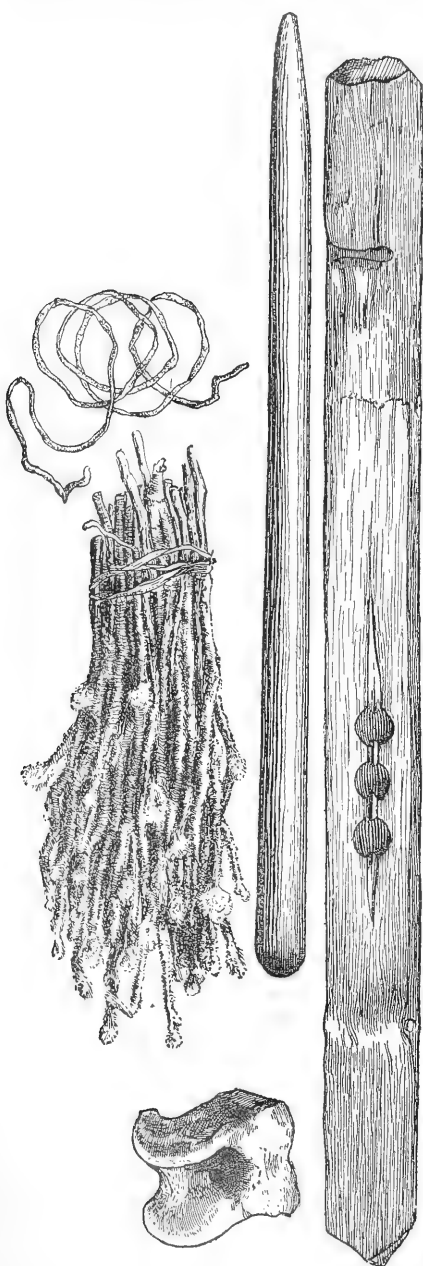


Fig. 31.

FIRE-MAKING SET (with mouthpiece of deer's knuckle-bone, thong, and tinder of willow catkins).

(Cat. No. 89822: U. S. N. M. Eskimo of Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A.)

* Nordenskiöld.—Voyage of the *Vega*, London, 1881, II, 121, 122.

tailed. He records that the "women appear to be more accustomed than the men to the use of this implement."

He gives also a most interesting observation on the use of a weighted pump drill among the Chukchis. The Chukchis also use flint and steel.*

The drilling set from Point Barrow (pl. LXXVI, fig. 32), will show the appearance of the parts of the fire-drill if we substitute the round stick for the flint drill. Some of the old drill stocks are pointed with finely chipped flint heads. The length of these points varies from 2 to 4 inches; the transverse section of one would be a parabola. They are in general more finely wrought than any of the prehistoric drills found in various localities all over the world. Prehistoric man was an adept in the art of drilling stone, bone, and shell; the stone tubes, some of them 18 inches long, bored very truly, are triumphs of the American Indians. Without doubt the prehistoric drill points were mounted like the Eskimo specimen, and were, perhaps, twirled between the hands, the almost universal method of using the fire-drill. Japanese carpenters drill holes in this way.

The winged mouth-piece is also a good example of workmanship. It is set with a mottled, homogeneous stone that is tolerably soft, which gives a minimum friction. This stone is much affected by the tribes over quite an extent of coast for labrets, etc. It is probably an article of trade as are flints. The bow is of walrus tusk, accurately made, but poorly engraved in comparison with the life-like art work of the southern Eskimo.

Another drilling set is from Sledge Island (pl. LXXVII, fig. 33). The Museum has no fire-making specimen from this locality. The drill stock is set with a point of jadeite lashed in with sinew cord. The bow is of walrus ivory; it is rounded on the belly and flat on the back. All Eskimo bows of ivory have a like curve, no doubt determined by the shape of the walrus tusk. In another, the most common form of the bow, its section is nearly an isosceles triangle, one angle coming in the center of the belly of the bow. The head is intended to be held in one or both hands; it agrees in form with the rude St. Lawrence Island heads.

Mr. E. W. Nelson collected at Unalakleet, in Norton Sound, a fire-drill, and the native names of the parts. The name of the set is *öö-jöö-gñ-tat*; the mouth-piece, *nä-ghöö-tuk*; the drill, *öö-jöö-ga-tuk*; the hearth of tinder-wood, *athl-uk*; the bow, *arshu-löw-shuk-pish-ik-sin-uk*.

This is a complete set (fig. 34) in first-rate order. The hearth has central holes along a deep median groove. Its bottom is flat, and it is rounded off on the sides and ends. All the parts are of pine wood, decorated in places with red paint. The drill is quite long, much longer than in any Eskimo set observed. It resembles more the Indian drill

* Nordenskiöld, — *Voyage of the Vega*. London, 1881, II, 120, 121,

for rubbing between the hands. The bow is of wood, which also is quite the exception in other Eskimo regions, where it is of ivory. There are many bows of antler from Norton Sound in the Museum, some of them skillfully and truthfully engraved. The mouth-piece is plain; not very well made. It is set with a square block of marble. It has the usual hole in one of the wings for the passage of a thong.

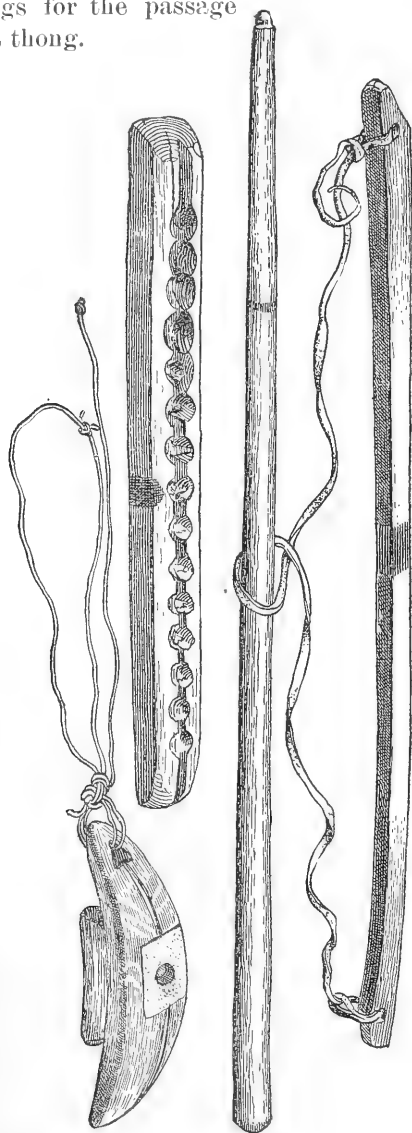


Fig. 34.

FIRE-MAKING SET (hearth showing median groove).

(Cat. No. 33166, U. S. N. M. Eskimo of Norton Sound, Alaska. Collected by E. W. Nelson.)

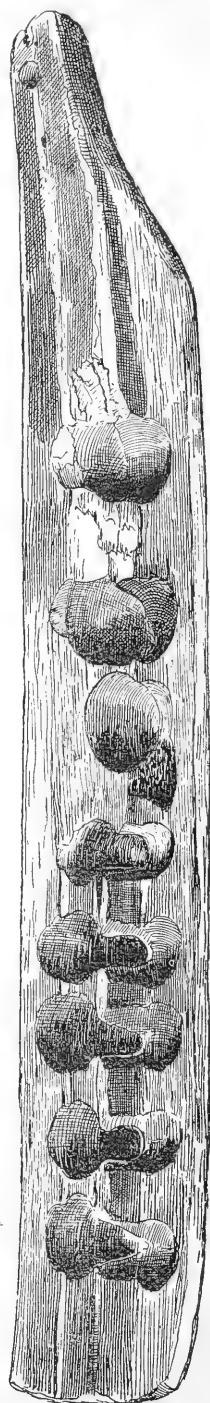


Fig. 35.

LOWER PIECE OF FIRE-MAKING SET (hearth).

(Cat. No. 39601, U. S. N. M. Eskimo of Cape Vancouver, Alaska. Collected by E. W. Nelson.)

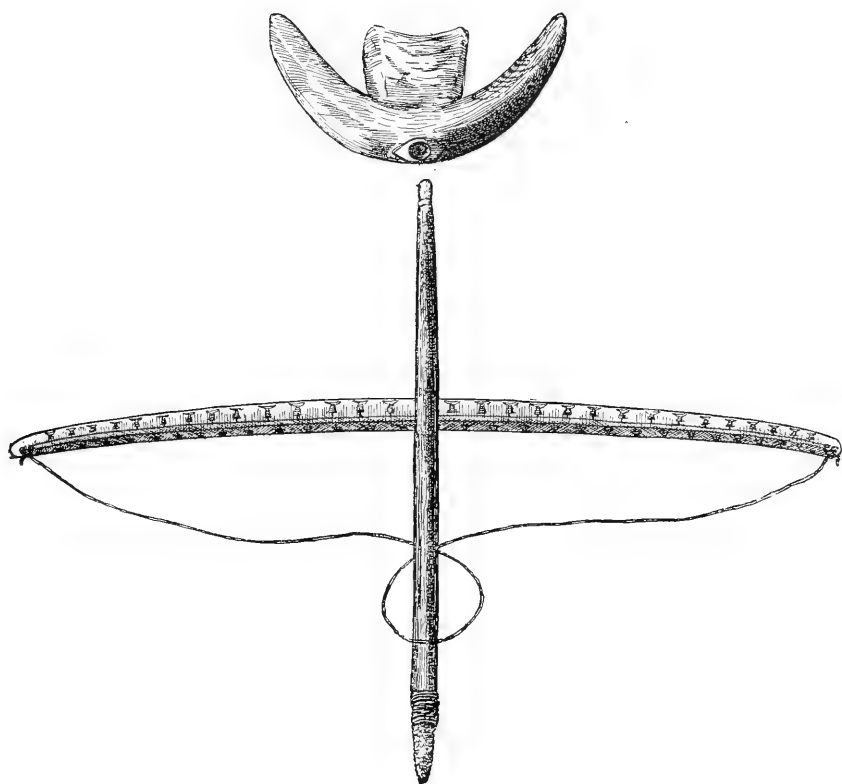


Fig. 32. BORING-SET. Cat. Nos. 89400, 89424, and 89630, U. S. N. M. Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A.

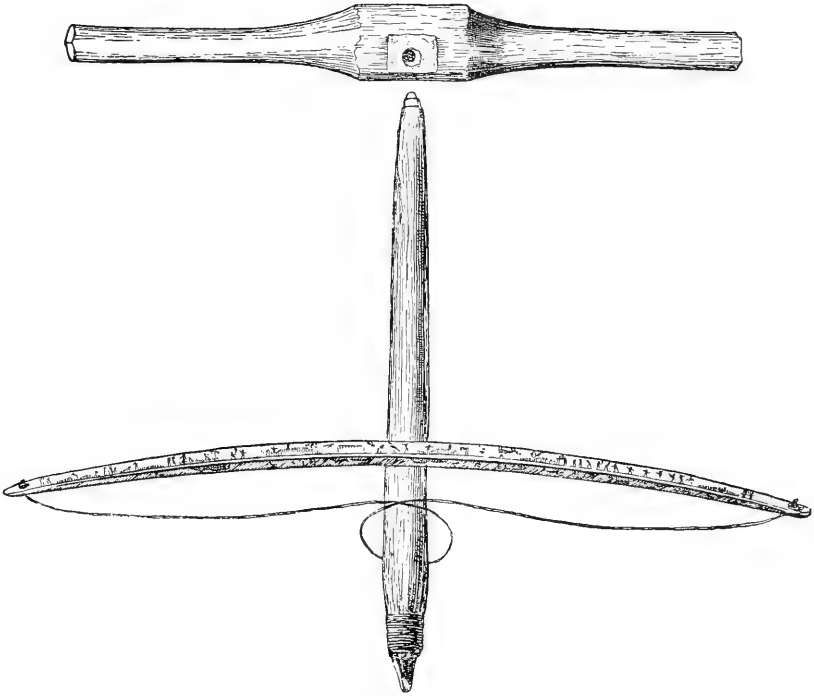


Fig. 33. DRILLING-SET. Cat. Nos. 25021, 44978, and 45108, U. S. N. M. Sledge Island, Alaska. Collected by E. W. Nelson.

Cape Vancouver is represented by a fine old hearth. This object has evidently been prized by its owner; it has had two rows of fire-holes (fig. 35), one row bored on the step in front of the first holes made; some of the holes are bored clear through. The reason why this was valued is, because the wood is so tindery that it is easy to make fire upon it.

Chalitmute, in the Kuskokwim region, on the northern side of the bay of that name, opposite Nunivak Island, is the next locality southward, to be considered. The parts of this set are exceptionally well-finished. The hearth is (pl. LXXVIII, fig. 36) stepped. It has four holes prepared for use; on one, fire has been made. The drill is unusually thick. The mouth-piece has no teeth-grip, and there is no evidence that it was ever held in the mouth. It is intended to be held in the hand. This mouth-piece is set with an oval socket-stone of black obsidian, ground down into facets and polished. The cord handles are fine, large teeth of the sea lion. The centers of the circles so characteristic of Eskimo art, are inlaid with wood. The holes for the drill cord are narrow; they must have been dug through with a sharp, narrow instrument. As before remarked, this is the region where the hand rest is more used than the mouth-piece, and the bow is not used at all.

The fire-making set from the Togiak River, was collected in 1886, by Sergt. I. Applegate, of the U. S. Signal Corps. Kassianamute, from which village it comes, is in the Bristol Bay region, but this set has a different appearance from the former outfits (pl. LXXIX., fig. 37). The hearth is a block of wood worked out at one end into a handle. It is remarkable in having central holes not connecting, and with no connecting grooves. In this it closely resembles the block from East Greenland (fig. 25). This hearth is of soft, tindery wood, and doubtless when the holes became too deep to allow the powder to mass around the edge, the upper part of hearth was scarped down. The mouth-piece is large, and is in the form of a seal. It has only a shallow, crescentic teeth-grip; from the size of the mouth-piece, its shape, and the absence of a block to fasten between the teeth, it must have been nearly always held in the hand of one of the operators. It is set with a round pebble, mottled with green. The cord is a thong of rawhide with handles of wood.

The next locality is Koggiung, on the southern shore of Bristol Bay, near its head. Two sets are shown from this locality. From the hearths it will be seen that both fire-slots on the side and center holes are used here. These sets are called *nŭ-tshŭn* (fig. 38). The apparatus shown in figure 38 has the stepped hearth. Both drill and hearth apparently have been made for sale. The mouth-piece is a good one, set with a large socket-piece of a black stone with green mottlings. This stone is tolerably soft. It is much used by the Bristol Bay Eskimo for making labrets, etc. The teeth-grip is very shallow. The hearth

(fig. 39) is of a very peculiar shape; only one other has been noticed like it. The wood is of the best kind, and fire has been made on it a number of times. In several places the holes have been bored clear through.

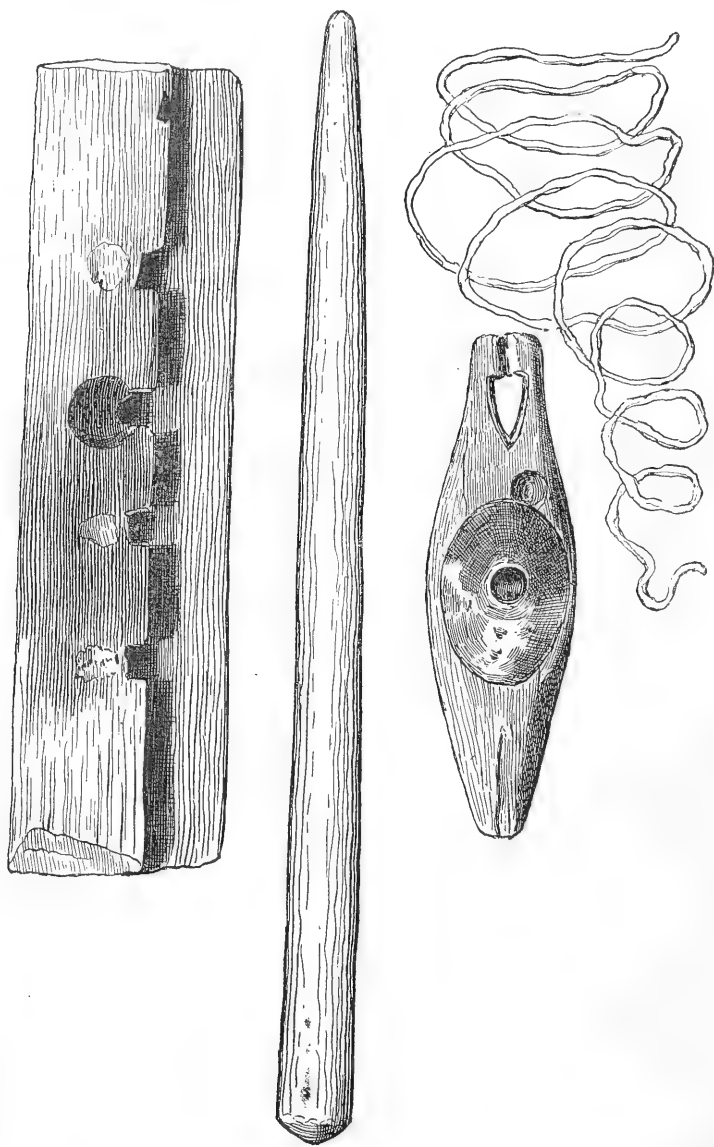


Fig. 38.

FIRE-MAKING SET (hearth with step and five slots).

(Cat. No. 127819a, U. S. N. M. Koggiung, Bristol Bay, Alaska. Collected by W. J. Fisher.)

The mouth-piece bears no evidence that it has been held between the teeth. It is highly probable that fire was made on these outfits more often by two persons, one holding the mouth-piece, or rest, and fanning

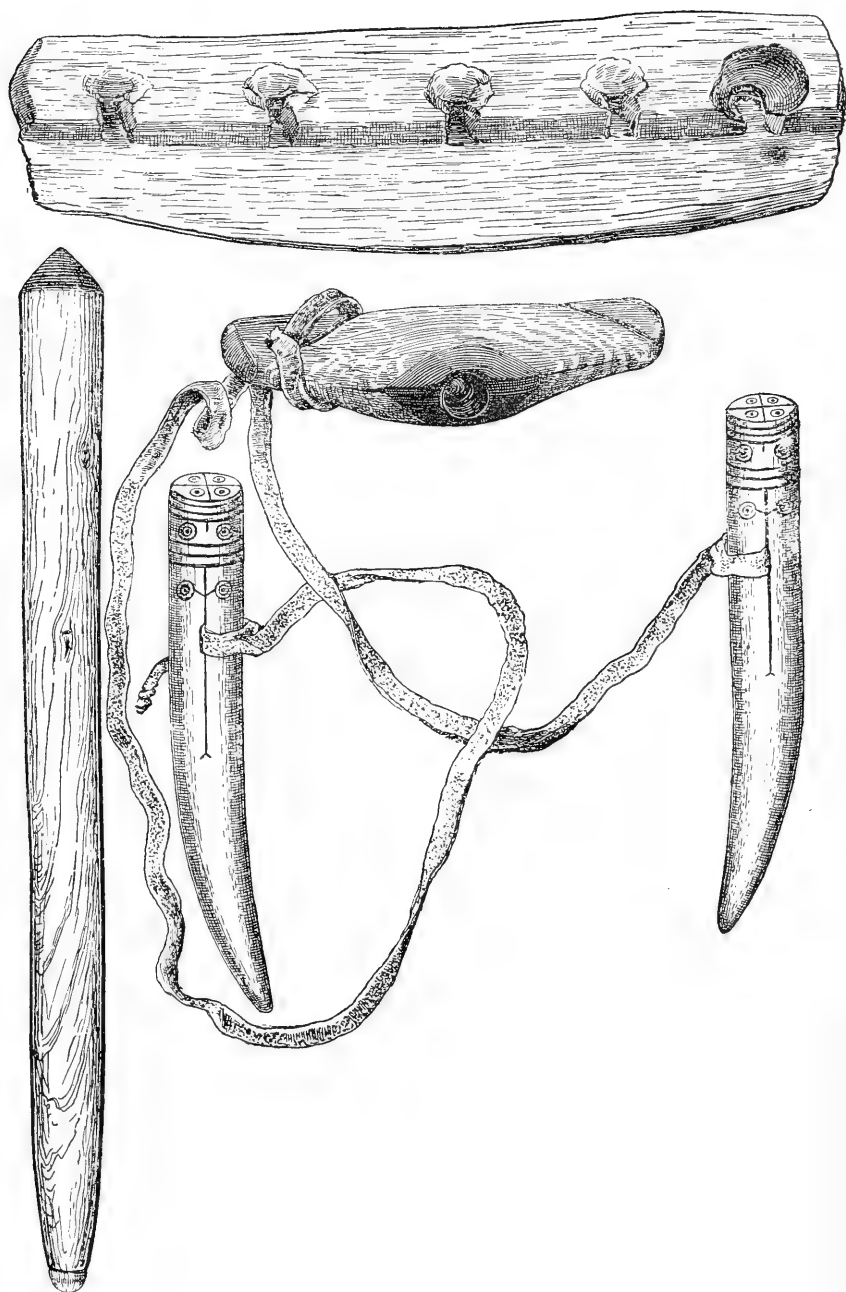


Fig. 36. FIRE-MAKING SET. Cat. Nos. 36325 and 37961, U. S. N. M. Eskimo of Chalitmute (Kuskokwim Region), Alaska. Collected by E. W. Nelson.

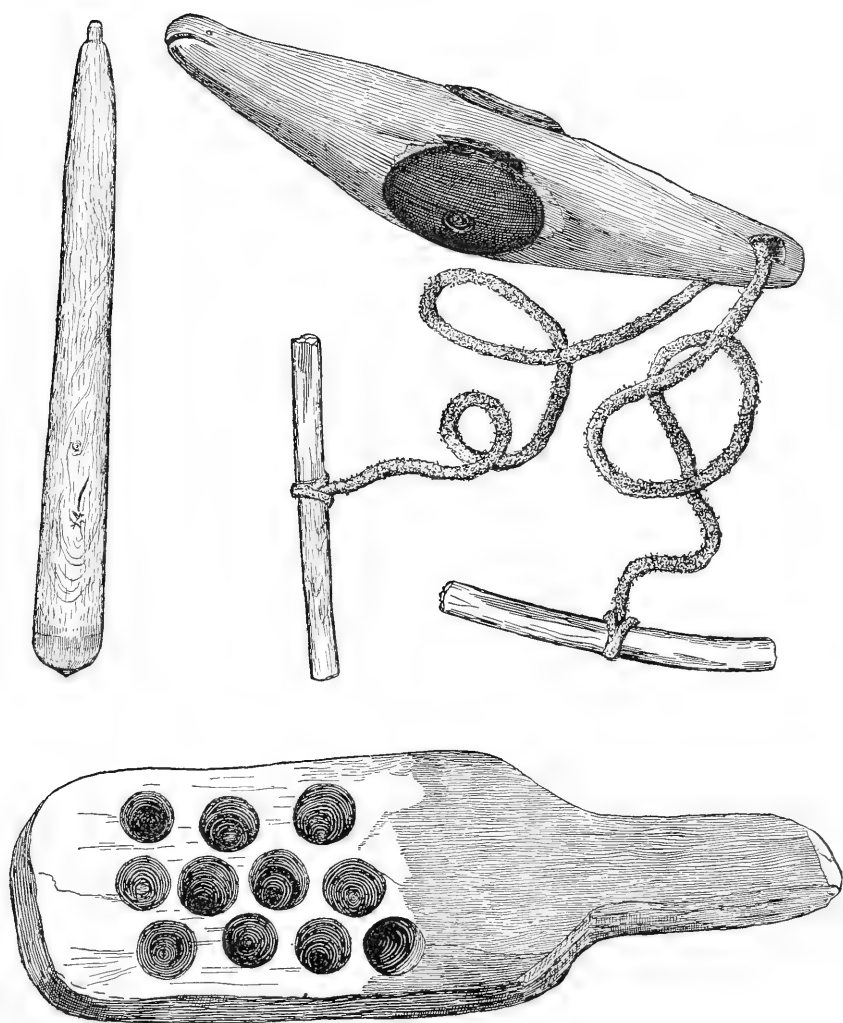


Fig. 37. FIRE-MAKING SET. Cat. No. 127520, U. S. N. M. Eskimo of Kassianamute (Togiak Region), Alaska. Collected by S. Applegate.

the flame, the other pulling the cord. This must be the method in Bristol Bay. Neither the true mouth-piece nor any bow has been procured by the Museum from this interesting region, from whence there are copious collections of ethnological objects. The cords without handles are worthy of notice.

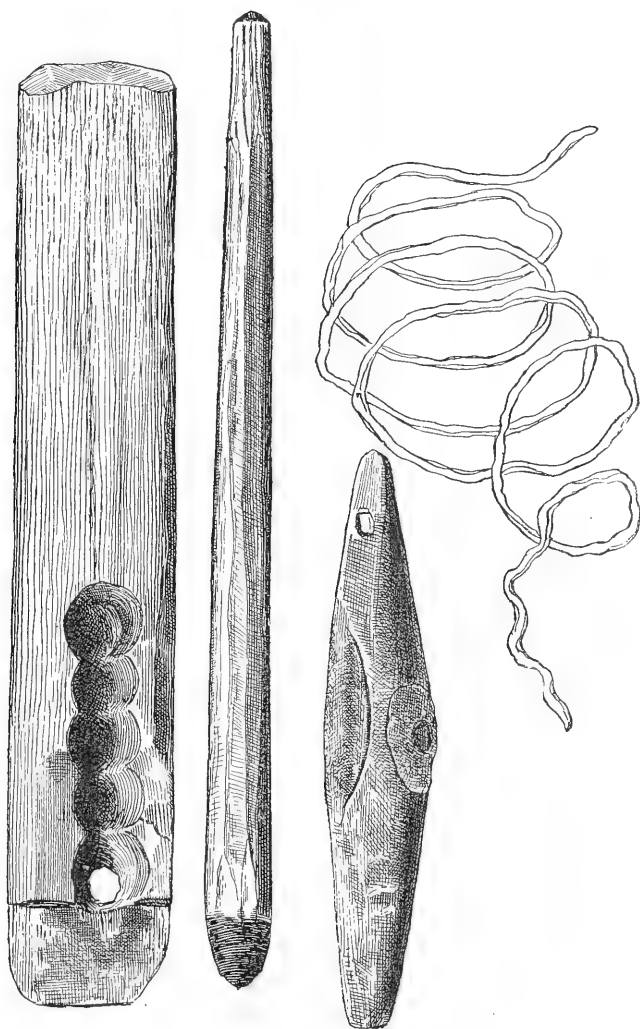


FIG. 39.

FIRE-MAKING SET (hearth with central holes and end step).

(Cat. No. 1278196, U. S. N. M. Koggiung, Bristol Bay, Alaska. Collected by W. J. Fisher.)

Another set from Bristol Bay is said by its collector, Charles McKay, to be used by both Eskimo and Indians. It is a very valuable outfit because of its completeness (pl. LXXX, fig. 40). The hearth is a rounded piece of wood with four large holes opening by slots onto the step. The

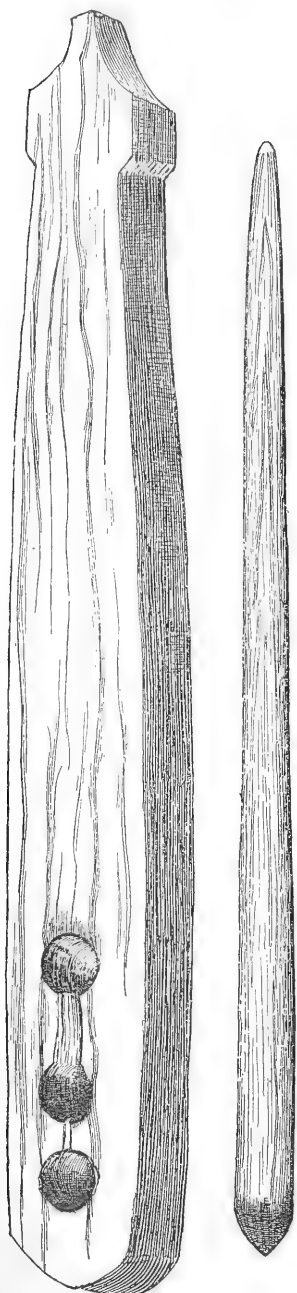


Fig. 41.

LOWER PIECE AND SPINDLE OF
FIRE-MAKING SET.(Cat. No. 72514, U. S. N. M. Eskimo of Kadiak
Island, Alaska. Collected by W. J. Fisher.)

drill is a thick, tolerably hard piece of close-grained wood like the hearth. The mouth-piece has no regular block for the teeth-grip, but has a crescentic gash on each side instead. It is set with a socket of a rock resembling marble. Nearly all the mouth-pieces south of Norton Sound are in the shape of seals, or other long animals. Cord handles are used attached to a thick thong of buckskin. Fungus is used for tinder and a blaze is started with cones of the larch. These are kept in the box, the lid of which is tied on with a thong.

Kadiak, the lowest limit of the western Eskimo, is as far south as the four part fire-drill extends by specimens in the Museum (fig. 41). The hearth is of cedar wood with three central holes with a connecting groove. It is neatly finished. The drill is also of cedar and bears the marks of the use of the thong; the top has also been used in the socket of a rest. The drill approaches in length those used for twirling between the hands by the Indians.

While the Aleutians use flint and steel, or a stone containing quartz and pyrites, struck against another stone, they still make use of the four-part drill at certain times. Hunting parties, says Mr. L. M. Turner, carry the drill to use when their matches run out. It takes two men to work it, one holding the hand rest and the other pulling the thong. The spindle is made of harder wood, so as to wear the light dust which ignites, from the hearth. A moment only is necessary to get fire; this is fed with tinder made of willow catkins and powdered charcoal. Sometimes, in order to get fire, they hold tinder at the mouth of a gun and ignite it by firing off a light charge of loose powder.

Possessed of four methods of getting fire, the Aleutian is superior to more fortunately situated people who depend wholly on matches.

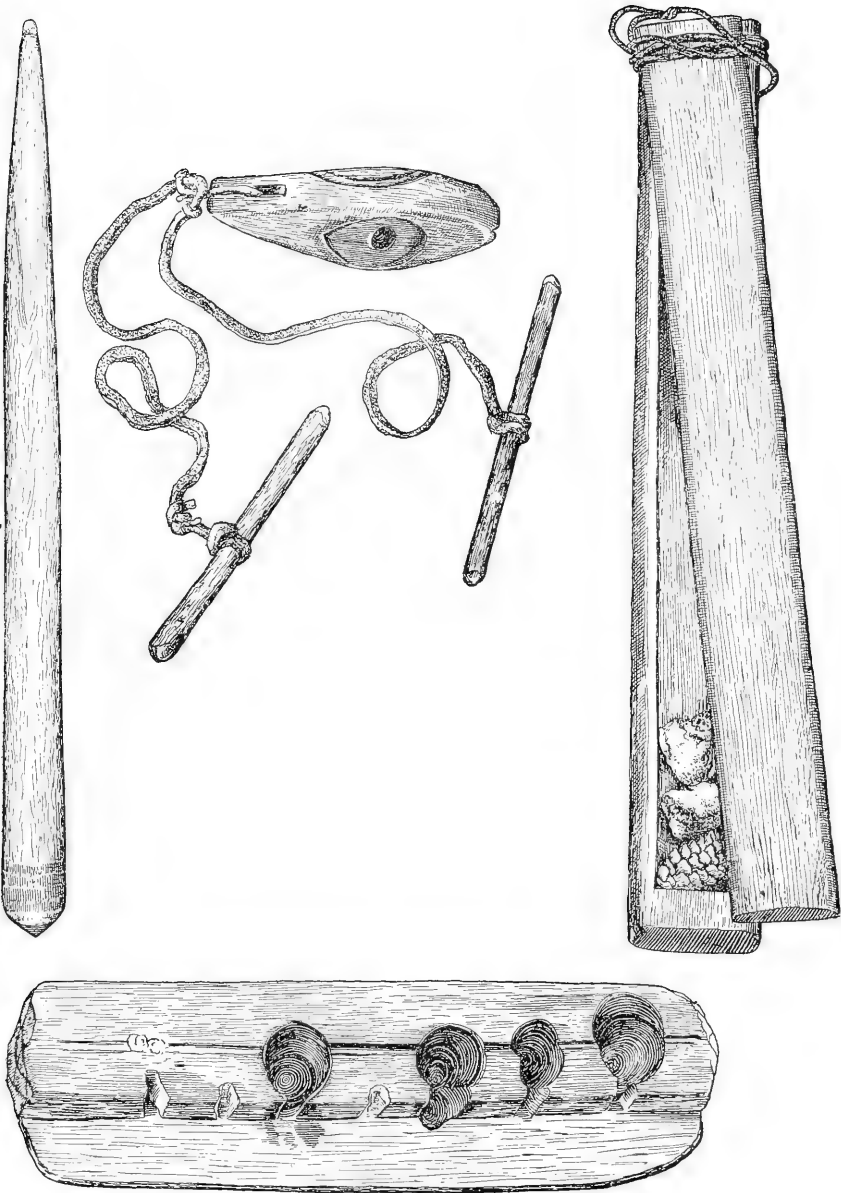


Fig. 40. FIRE-MAKING SET. Cat. No. 55938, U. S. N. M. Eskimo of Bristol Bay, Alaska. Collected by Charles McKay.

II.—FIRE-MAKING BY SAWING.

Prof. Alfred Russel Wallace has noted the method by sawing in his work entitled "The Malay Archipelago," p. 332: Two pieces of bamboo are used; a sharp edge piece like a knife is rubbed across a convex piece in which a notch is cut, nearly severing the bamboo (fig. 42); after sawing across for awhile the bamboo is pierced, and the heated particles fall below and ignite. The Ternate Malays and the Tungaras of British North Borneo* have improved upon this by striking a piece of china with tinder held with it against the outside of a piece of bamboo, the siliceous coating of the latter yielding a spark like flint. Both of the methods mentioned are in use at different points in the area affected by Malay influence.

The Chittagong hill tribes, on the eastern frontier of British India, use sand on the sawing knife to increase the friction.†

The Karens of Burma, Dr. R. M. Luther informs the writer, hollow out a branch of the *Dipterocarpus* tree like the lower piece of bamboo spoken of, cut a transverse notch, and saw across in it with a rubber of iron-wood. The wood fibers ground off form the tinder; the coal is wrapped up in a dry leaf and swung around the head till it blazes. It takes only two or three minutes to get a blaze this way.

Bearing upon the origin of this method of sawing in these localities, nature is alleged to suggest the way and to repeat the process that would give to fireless man the hint. Mr. W. T. Hornaday relates that many fires are started in the jungle by bamboo rubbing together in a high wind-storm. The creaking is indescribable; the noise of the rasping and grinding of the horny stems is almost unendurable.

In many tribes it is found that often there is more than one method of fire-making practiced. For instance, in Borneo, as we have seen, the Tungaras use the sawing method, the Saribus Dyaks the *besiapi*, or fire syringe, a most interesting fact,‡ other Dyaks the rotary drill,§ while the Rev. Dr. Taylor says that the Dyaks are acquainted with the use of the bow and string and the upright stick and cord (pump drill). In connection with all these methods probably flint and steel were used.

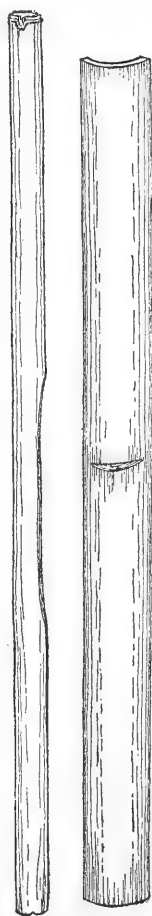


Fig. 42.

MALAY FIRE STICKS.

(Cat. No. 129775, U. S. N. M. Models in bamboo made by Mr. Hough after Prof. A. R. Wallace's description. The Malay Archipelago, p. 332.)

* D. D. Daly.—Proc. Roy. Geog. Soc. 1888. p. 10.

† Capt. T. H. Lewis.—Hill tribes of Chittagong. Calcutta, 1869. p. 83.

‡ The American Anthropologist. Washington, 1888. 1, No. 3, p. 294.

§ J. G. Wood.—The Natural History of Man. II, p. 502.

So in Australia, while the rotary drill is the usual way, some tribes have acquired the art of producing fire with knife or rubber, that is, the sawing method presumably under foreign influence.*

III.—FIRE-MAKING BY PLOWING.

One of the most marked of fire-making methods in its distribution is that pursued by the Pacific Islanders, confined almost entirely to the Polynesian cultural area. It has spread to other islands, however, being met with among the Negritos of New Britain:



Fig. 43.

FIRE-MAKING STICKS
(a SHOWING GROOVE).

(Cat. No. 130675, U. S. N. M.
Samoa. Deposited by Harold
M. Sewall.)

a They rub a sharpened piece of hard stick against the inside of a piece of dried split bamboo. This has a natural dust that soon ignites. They use soft wood when no bamboo can be procured, but it takes longer to ignite. The flame is fed with grass.†

There is a close connection between the Malay sawing method and this, as there is a decided Malay preponderance in the make-up of the population of the Islands.

The fire-sticks shown (fig. 43) were procured by Mr. Harold M. Sewall, at Samoa, and deposited in the museum by him.

The wood is a light corky variety, probably of the *Hibiscus tiliacus*, which is used for this purpose at Tahiti, or perhaps it is of the paper mulberry. The rubber may be of some hard wood, although fire may be made by means of a rubber of the same kind of wood as that of the hearth, though no doubt it requires a longer time to make fire if this is done. In the Sandwich Islands, Mr. Franklin Hale Austin, secretary of the King, states that the rubber is of *koh* or *ohia*, that is, hard wood and the hearth of *hon*, or soft wood, and the friction is always in soft woods; this is true, I believe, everywhere this method is practiced, in spite of the fact that a soft rubber on hard wood will answer as well.

Lieut. William I. Moore, U. S. Navy, gave the writer a complete description of the manipulation of the Samoan fire-getting apparatus.

The blunt pointed stick is taken between the clasped hands, somewhat as one takes a pen, and projected forward from the body along the groove at the greatest frictional angle consistent with the forward motion which has been found to be from 40 to 45 degrees. Kneeling on the stick the man forces the rubber forward, slowly at first, with a range of perhaps

* R. Brough Smith.—The Aborigines of Victoria. London, 1878. I, p. 393.

† W. Powell.—Wanderings in a Wild Country. p. 206.

6 inches, till the wood begins to be ground off and made to go into a little heap at the end of the groove; then he gradually accelerates the speed and moves with a shorter range until, when he pushes the stick with great velocity, the brown dust ignites. This is allowed to glow and if it is required to be transferred to dry leaves or chips of wood it is done by means of a tinder made of frayed or worn tapa cloth.

The groove (fig. 43a) is the most characteristic feature of this apparatus, there being apparently no definite form of implements for this purpose. Fire is made on any billet of dry wood that is available. It is not necessary to cut a slot, or even a groove, the hard wood rubber will form one, so that there is no more need of apparatus than among the Navajos, where two bits of yucca stalk collected near by form the fire tools.

That making fire by this way is difficult to those inexperienced in it is not strange. Mr. Darwin found it quite so, but at last succeeded. The Samoan gets fire in forty seconds, and so great is the friction and the wood so well adapted that Mr. Austin, before quoted, says it sometimes actually bursts into flame.

The Australians in some parts use a method very much like the one described. They rub a knife of wood along a groove made in another stick previously filled with tinder.*

IV.—PERCUSSION.

1. FLINT AND PYRITES.

Ac primum silicii scintillam exendit Achates
Suscepitque ignum foliis atque arida circum
Nutrimenta dedit, rapuitque in fomite flammam.

(Æneid B. 1, 174-176.)

One of the oldest methods of fire-making that we know of is, that by the percussion of flint and pyrites. It is believed to have been the original discovery. If there is any difference in the difficulties of conception and execution in either of the inventions, it lies in favor of the sticks of wood.

The distribution of the flint and pyrites method, both in time and place, is very interesting. Mr. Evans, in his epoch-making work, "Ancient Stone Implements," page 14, remarks that the name of pyrites (*πυρ*, fire) is itself sufficient evidence of the purpose to which the mineral was applied in ancient times. Whatever the fact is in Roman history, the Eskimo calls pyrites firestone, some Indian tribes call flint firestone, the German name for flint is *feuerstein*, and it is a reasonable supposition that whatever people used flint or quartz, pyrites, or other forms of iron ore for making fire, would call the stone firestone. The statement of Pliny that fire was first struck out of flint by Pyrodé, the son of Cilix, Mr. Evans thinks, is a myth which points to the use of silex and pyrites, rather than to steel.

* R. Brough Smith.—The Aborigines of Victoria. London, 1878. I, p. 394.

Mr. Thomas Wilson calls my attention to a discovery of a pyrites nodule by M. Gaillard, in a flint workshop on the island of Guiberon in Brittany. The piece bore traces of use. Mr. Wilson thinks that the curved flakes of flint like the one figured, found so numerous, were used with pyrites as strike-a-lights. The comparative rarity of pyrites is, perhaps, because it is easily decomposed and disintegrates in unfavorable situations in a short time, so that the absence of pyrites does not militate against the theory that it was used. A subcylindrical nodule of pyrites $2\frac{1}{2}$ inches long and bruised at one end was found in the cave of Les Eyzies, in the valley of Vézère, Perigord, mentioned in *Reliquæ Aquitanicæ*, page 248. This is supposed to have been a strike-a-light.

Prof. W. B. Dawkins thinks that—

In all probability the Cave-man obtained fire by the friction of one piece of hard wood upon another, as is now the custom among many savage tribes. Sometimes, however, as in the Trou de Chaleux, quoted by M. Dupont (*Le Temps Préhistorique en Belgique*, second edition, page 153), he may have obtained a light by the friction of a bit of flint against a piece of iron pyrites, as is usual with the Eskimos of the present day.*

Mr. Dawkins also says that fire was obtained in the Bronze Age by striking a flint flake against a piece of pyrites, sometimes found together in the tumuli. He figures a strike-a-light from Seven Barrows, Lambourne, Berks, England, an outline of which is reproduced here for comparison with the one from Fort Simpson, British Columbia (fig. 44a and b). Pyrites has been found in a kitchen-midden at Ventnor, in connection with Roman pottery† Chambers's *Encyclopædia*, article, Pyrites,‡ is authority for the statement that pyrites was used in kindling powder in the pans of muskets before the gun flint was introduced.

It is thus seen that this art has a high antiquity, and that on its ancient areas its use comes down nearly to the present day, the flint and steel being its modern or allied form.

In North America this art is distributed among the more northerly ranging Indian tribes, and the Eskimo of some parts. Its use was and is yet quite prevalent among the Indians of the Athapascan (formerly Tinné) stock of the north. By specimens in the Museum, and notes of explorers, it is found to range from north of Dixon's Sound to Labrador, the following localities being represented, viz: Stikine River, Sitka, Aleutian Islands, Kotzebue Sound, Point Barrow, the Mackenzie River district, at Fort Simpson, and probably Hershel Island, Pelly Bay, Melville Peninsula, Smith Sound, and Labrador. The Canadian and Algonquins strike two pieces of pyrites (*pierres de mine*) together over an eagle's thigh, dried with its down, and serving instead of tinder.|| From

* Dawkins.—*Early Man in Britain*. London. p. 210.

† *Loc. cit.*, p. 258.

‡ *J. Anthropol. Inst.* Great Britain and Ireland. VII, p. 83.

|| Lafitan.—*Mœurs des Sauvages Américains*. p. 272. An earlier account is found in Le Jeune, *Relation de 1634*, p. 24. Quebec, 1858.

other sources we know that the extinct Beothucs, of Newfoundland, did the same.*

As far as can be ascertained, the Eskimo and Indians both use the method, so that it is not characteristic of either, as the four-part drill is of the Eskimo, as contrasted with the simple rotation sticks of the Indians. A description of a flint and pyrites outfit, as at present used, will give a general idea of the status of the invention. In different localities the manipulation differs somewhat, as will be noted farther on.

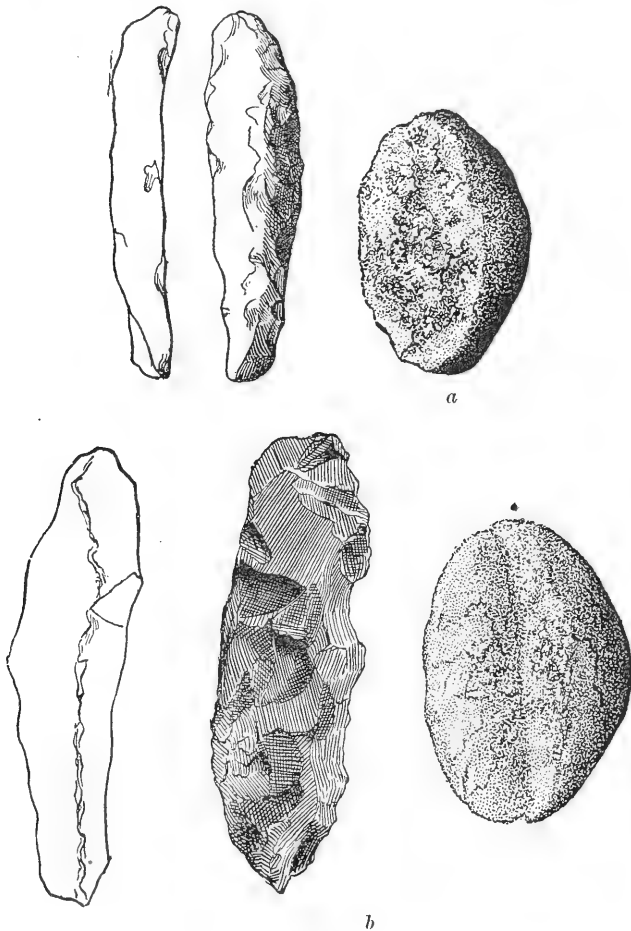


Fig. 44.

a STRIKE-A-LIGHT.

(Seven Barrows, Eerks County, England. From Lubbock's *Early Man in Britain*, p. 258.)

b STRIKE-A-LIGHT.

(Cat. No. 1861, U. S. N. M. Indians of Fort Simpson, Mackenzie River district, B. C. Collected by B. R. Ross.)

The strike-a-light (No. 128405) was collected by Capt. E. P. Herendeen from natives who told him that it came from Cape Bathurst, hence

* *J. Anthrop. Inst.* Great Britain and Ireland, v, p. 225.

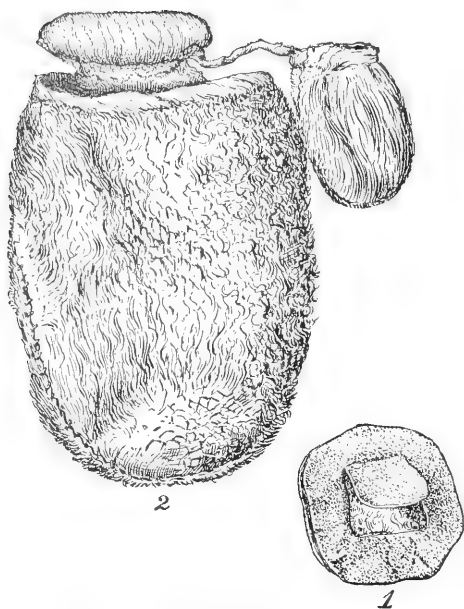


Fig. 45.—1. TINDER POCKET. 2. FIRE BAG.
(Part of Strike-a-light set).

(Cat. No. 128405, U. S. N. M. Mackenzie River District, B. C. Col-
lected by E. P. Herendeen.)

from the down from the stems and catkins of various species of dwarf arctic willows. At present the natives often soak the tinder in a strong solution of gunpowder and water to make it quick; an older way was to mix powdered charcoal with it. This plan is like the charring of the linen rags used in the old-fashioned tinder boxes of forty years ago. The Eskimo then puts the tinder into a little round, flat pouch, with a flap in the middle (fig. 45, 1).

The pyrites (fig. 46, 3) looks like a short pestle, too much of which appearance the repeated scraping has no doubt given rise. The upper end is concave, while the lower end has the original smooth surface of the concretion. Pyrite is found at Point Barrow in spherical masses of various sizes up to several pounds in weight. These spheres are nearly always cracked in two and scraped on the plane

he assigned the specimen to this locality on the evidence. Mr. John Murdoch has, with a great deal of probability, questioned this and thinks that it came from Herschel Island with the rest of Mr. Herendeen's collection and did not come from as far east as Cape Bathurst. While there is no improbability that this method is practiced at Cape Bathurst, yet the specimen has the appearance of the Mackenzie River strike-a-lights, hence it is deemed advisable to locate it in the Mackenzie River district at Herschel Island.

The essential parts of the apparatus are a piece of pyrites, a piece of flint and tinder. In the more northern parts of the Eskimo area, tinder is made

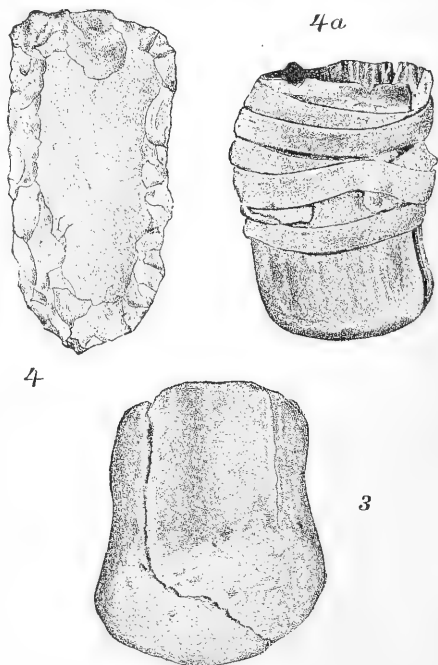


Fig. 46. 3. PYRITES. 4, 4a. FLINT STRIKER AND
HANDLE.

(Part of Strike-a-light set.)

(Cat. No. 128405, U. S. N. M. Mackenzie River District, B. C.
Collected by E. P. Herendeen.)

surface for very obvious reasons. This gives the shape seen in Fort Simpson and Long Barrows specimen. Mr. Murdoch says that the Eskimo think that pyrites comes down from above in meteors. They call it "firestone." A native related that in old times they did not use flint, but two pieces of pyrites, and got "big fire."

The flint (fig. 46, 4) is an oblong piece of chert, square at the base and rounded at the forward end. It is more elaborately made than the flakes so numerous in Europe, one of which was found with the piece of pyrites in the English Barrows. The Mackenzie River scraper is more like the curved ancient one (fig. 44*b*). In most cases the flints used are not mounted in a handle; this specimen, however, is fixed in a handle made of two pieces of wood held together by a thong of seal-skin (fig. 46, 4*a*).

The bag (fig. 45, 2) is made of reindeer skin. The little bag that hangs from the larger has a double use; it is a receptacle for reserve tinder, but its chief use is for a toggle; being passed under the belt it prevents the loss of the outfit, which is said to be carried by the women.

An oblong pad, stuffed with deer hair, is sewed to the mouth of the fire-bag to protect the hand from sparks and blows of the flint.

To get a spark, the Eskimo places (fig. 47) the piece of pyrites on the pad held in the left hand over the curved forefinger, the large end down and the thumb set in the cup shaped cavity in the top. The flap of the tinder pocket is turned back and held on the forefinger under the protecting pad. The flint is held in the right hand and by a scraping motion little pieces of pyrites at a dull red heat fall down into the tinder. The pellet that glows is transferred to the pipe or fire, and the flap of the tinder pocket is turned down, serving to keep the tinder dry and to extinguish it if necessary.*

There comes in here appropriately a note of B. R. Ross on the burial customs of the Kutchin Indians of the eastern Athapascan stock. He says:

They bury with the dead a flint fastened to a stick, a stone to strike it on (pyrites) to make fire, and a piece of the fungus that grows on the birch tree for tinder and some touch-wood also.†

There is no mention of this process of fire-making by the older writers



Fig 47.

METHOD OF USING THE STRIKE-A-LIGHT.
(Cat. No. 128405, U. S. N. M. Drawing by W. H. Burger.)

* Extracted from an article by the author in Proceedings U. S. National Museum, xi, 1888, 181-4.

† Smithsonian Report. 1866. p. 326.

on Greenland, Cranz and Egede, though they carefully note and describe the plan by wood-boring. Later explorers going higher north in western Greenland have found it. Dr. Emil Bessels, writing about the Itah Eskimo of Smith Sound, says:

The catkins of the arctic willow are used as tinder to catch the sparks which have been produced through the grinding of two pieces of stone.*

Dr. E. K. Kane gives a more complete account from nearly the same locality, the Arctic Highlands of northwest Greenland. He says that the Eskimo of Anootok struck fire from two stones, one a plain piece of angular milky quartz, held in the right hand, the other apparently an oxide of iron [pyrites or iron ore?] They were struck together after the true tinder-box fashion, throwing a scanty supply of sparks on a tinder composed of the silky down of the willow catkins (*Salix lanata*) which he held on a lump of dried moss.†

Very much farther west on Melville Peninsula Parry gives a complete and interesting description of the primitive way. This account gives us a link between the western and eastern Eskimo. He writes:

For the purpose of obtaining fire, the Eskimo use two lumps of common pyrites, from which sparks are struck into a little leathern case (see fig. 25, pl. LXXIV) containing moss well dried and rubbed between the hands. If this tinder does not readily catch, a small quantity of the white floss of the seed of the ground willow is laid above the moss. As soon as a spark has caught it is gently blown till the fire has spread an inch around, when the pointed end of a piece of wick being applied, it soon bursts into a flame, the whole process having occupied perhaps two or three minutes.‡

The Museum was in possession of a specimen catalogued, "Moss-bag and lumps of pyrites used by Innuit for getting fire," collected by Capt. C. F. Hall at Pelly Bay, in latitude 69°, longitude 90°, several degrees west of Melville Peninsula.

The only other record of the process under consideration among the Eskimo is found in the Aleutian Islands. There is absolutely no evidence had by the writer that the Eskimo south of Kotzebue Sound (Western Eskimo) use the pyrites and flint for making fire. The latest information about the Aleutian Islanders is given in a manuscript of the careful explorer, Mr. Lucien M. Turner. His observation will serve to explain the description of striking a light by earlier travelers.

They use the four part drill but they also use pyrites. A stone containing quartz and pyrites is struck against another similar one, or a beach pebble, into a mass of sea bird down sprinkled with powdered sulphur. This ignites and is quickly caught on finely shredded blades of grass or beaten stalks of wild parsnips. This method prevails to this day on the islands west of Unalashka.

The people told Mr. Turner that this was the ancient way. There is a doubt in the writer's mind that Sauer's (Billing's Expedition, page 59), and Campbell's (Voyage, page 59,) observations, brought together by Bancroft,§ were accurate with regard to the stones used. All the

* Die amerikanische Nordpol-Expedition. Leipzig, 1879. p. 358.

† Kane.—Arctic Explorations. I, p. 379.

‡ Parry.—Second Voyage. London, 1824. p. 504.

§ Bancroft.—Native Races of the Pacific States. I, p. 91.

other details are correct, but they say they took two pieces of quartz, rubbed them with sulphur, and struck them together. It is well known that pieces of quartz even when rubbed with sulphur will not strike a spark of sufficient heat to cause ignition. The pieces used must have been pyritiferous quartz as noticed by Mr. L. M. Turner.

To resume, the following facts arise out of the foregoing considerations of the flint and pyrites method:

(1) It is very ancient, inferring from the few reliable finds of pyrites and flint in juxtaposition.

(2) Its distribution is among high northern tribes, both Eskimo and Indian.

(3) As far as known, its range is limited to this area, only one other instance coming to our notice, that of the Fuegians.

2. FLINT AND STEEL.

The flint and pyrites method is the ancestor of the flint and steel. The latter method came in with the Iron Age. It is found in the early settlements of that period. A steel for striking fire was found in the pile dwellings of the Ueberlinger See.* The Archæological Department of the Museum has a specimen of a strike-a-light of the early age of iron in Scandinavia. It is a flat, oval quartz stone with a groove around the edge; it is thought to be for holding a strap by which it could be held up and struck along the flat surface with the steel. It is scored on these surfaces. The specimen in the Smithsonian is from the national museum at Stockholm. In Egypt it is believed to have been used for a long period, though there is no data at hand to support the conclusion.† In China it has been in use for many centuries. Chinese history, however, goes back to the use of sticks of wood. The *briquet* must have been carried nearly everywhere by early commerce from the ancient countries around the Mediterranean, as it was into new lands by later commerce.

Many persons remember the tinder-box that was taken from its warm nook beside the fire-place whenever a light was wanted; the matches tipped with sulphur used to start a blaze from the glowing tinder are also familiar to the older generation. The tinder-boxes in use in this country were just like those in England from time immemorial down to fifty years ago (fig. 48). Mr. Edward Lovett, of Croydon, England, who has studied this matter thoroughly, calls attention to the resemblance of the old English tinder-flints to the neolithic scrapers. These scrapers, picked up at Brandon, can scarcely be discriminated from those made at the present time at that place, and there is a suspicion that the present tinder-flint has come down directly from neo-

* Keller.—Swiss Lake Dwellings. Pl. XXVIII, fig. 29.

† Sir J. W. Dawson gives an interesting account of the strike-a-light flints used in Egypt in 1844, in *Modern Science in Bible Lands*, p. 30;

lithic times. The old English steel, or "Flourish," (fig. 48) is the characteristic shape, and has been carried by English commerce into many places. A picture of a strike-a-light used by the Lenguas of Brazil, seen lately, shows the unmistakable old "flourish."

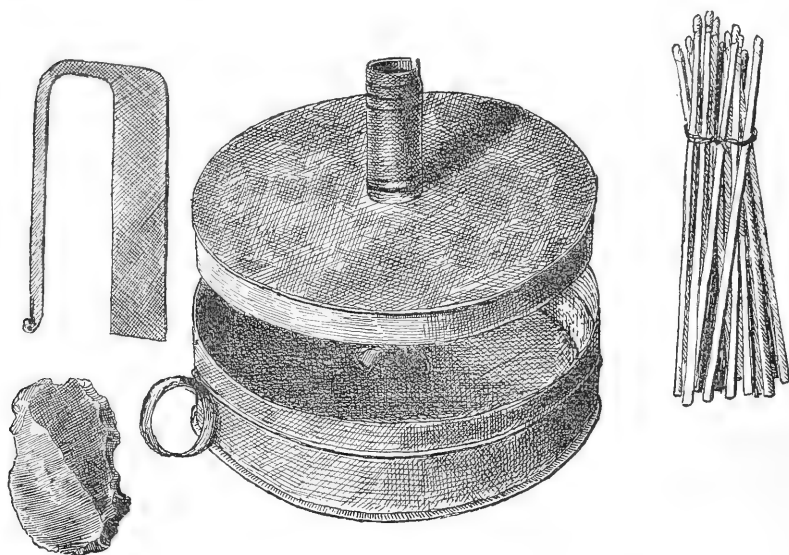


Fig. 48.

ENGLISH TINDER-BOX (with flint, "flourish," and bundle of spunks.
(Cat. No. 75516, U. S. N. M. England. Collected by Louis and Maurice Farmer.)

The tinder-boxes had also a damper to extinguish the tinder of burnt linen and to keep it dry. The lids were furnished often with a candle socket. This feature, says Mr. Lovett, has led to their preservation as candle-sticks long after they were superseded by matches.

Many devices were invented in order to improve on the crude way of holding the flint and steel in the hands to strike the spark into the tinder-box. One of these was the wheel tinder-box (fig. 49). The com-

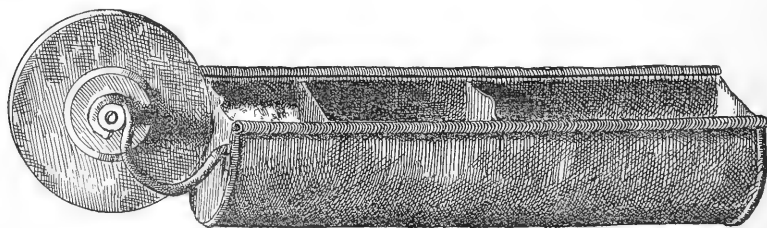


Fig. 49.

WHEEL TINDER-BOX.

(Cat. No. 130431, U. S. N. M. Broadalbin, N. Y. Presented by F. S. Hawley.)

partment near the wheel held the tinder. The flint was placed in a socket on the sliding lid, and the wheel was turned by unwinding a string from off its axle with a sharp pull as in spinning a top. The

flint was pressed against the rapidly revolving wheel and a shower of sparks fell into the tinder. The tinder pistol, whose name suggests its use, was another device.*

Other devices were intended to be carried in the pocket, and were probably brought out by the introduction of tobacco and the need of smokers for a convenient light.

The pocket strike-a-light is still used. The one shown (fig. 50) was bought in 1888 by Mr. E. Lovett, at Boulogne-sur-mer. They are still

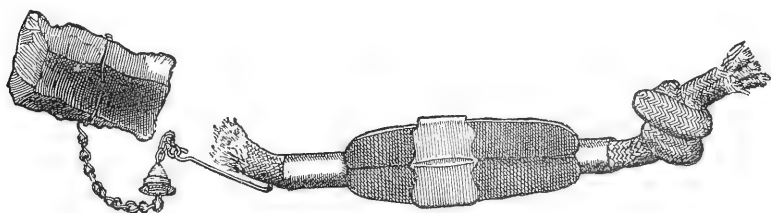


Fig. 50.

STRIKE-A-LIGHT (Briquet).

(Cat. No. 124693, U. S. N. M. Boulogne-sur-mer. France. Collected by Edward Lovett.)

used by the peasants and work-people of France. An old specimen in the Museum of this character is from Lima. The roll of tinder, or "match," is made of the soft inner bark of a tree.

Among many of our North American tribes the flint and steel superseded the wooden drills as effectually as did the iron points the stone arrow-heads.

Some of these tribes were ripe for the introduction of many modern contrivances. Civilized methods of fire-lighting appealed to them at once. Among the Chukchis, Nordenskiöld says, matches had the honor of being the first of the inventions of the civilized races that have been recognized as superior to their own.† It was so among our Indian tribes; the Mandan chief "Four Bears" lighted his pipe by means of a flint and steel taken from his pouch when George Catlin visited him in 1832.‡

The Otoes (Siouan stock) made use of the flint and steel shown in fig. 51. The flint is a chipped piece of gray chert, probably an ancient implement picked up from the surface.

The steel is a very neatly made oval, resembling those of the Albanian strike-a-lights,§ or the Koordish pattern, (fig. 54). Here arises one of the perplexities of modern intercourse, perhaps both of these steels were derived from the same commercial center.

* See figure in D. Bruce Peebles's address on Illumination, in Trans. Roy. Scottish Society of Arts, Edinburgh, XII., part I, p. 96.

† Nordenskiöld.—Voyage of the *Vega*. II, p. 122.

‡ The George Catlin Indian Gallery. Smithsonian Report. 1885. II, p. 456.

§ See figure in Jour. Anthropol. Inst. Great Britain, XVI, 1886, p. 67.

The flint, steel, and tinder were always carried in a pouch, usually suspended from a belt as in specimen No. 8481 from the Assiniboina (Siouan stock) of Dakota. This is a buckskin waist-belt, beaded and fringed, ornamented with bells of tin. It supports a flapped pouch for the flint, etc. The tinder used was fungus.

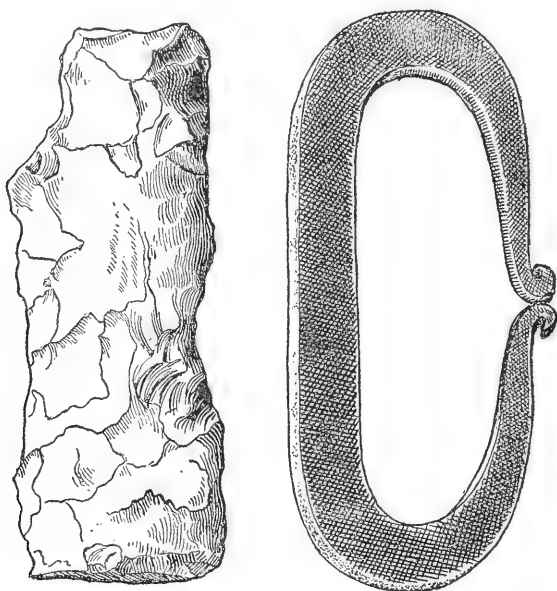


Fig. 51.

FLINT AND STEEL.

(Cat. No. 22131, U. S. N. M. Otoe Indians, Kansas and Nebraska. Collected by J. W. Griest.)

The pouch of the Cheyennes (Algonquian stock) is compact, and neatly made of leather (fig. 52). The equipment is complete and of a superior order. The bone cup is used to hold the tinder while striking a spark into it. It is the tinder horn of early days, a cow's horn which was used to hold tinder before sheet-iron boxes came into use. The Lengua of Brazil use a horn for the same purpose.* In the Aino set, (fig. 57), and the Eskimo strike-a-light, (fig. 45), can be seen this feature. The tinder with this set is rotten wood. Nearly all Indians know the value of fungus tinder.

The Comanche Indian strike-a-light is a similar pouch to the one described, but much poorer in equipment (fig. 53.) A broken rasp, a piece of chert, and a piece of spunk, is enough for the purpose, and a bag made from a saddle skirt to hold them, completes the outfit.

The flint and steel is still used nearly all over Mexico, Dr. Palmer informs me. There is at present a manufacture of gun and strike-a-light flints at Brandon, England, whence they are shipped to Spain,

* See figure in *Jahrbuch Mittelschweiz. Commercial. Gesellsch. Arau, Zweiter Baud*, 1888, pp. 114-115.

Mexico, Italy, and other civilized countries. Doubtless this flint from Guadalajara (fig. 54) came from Brandon. It is real calcareous flint, such as does not exist in this country. The flint is the "swallow-tail" pattern. The tinder is of prepared fungus sold in little packets.

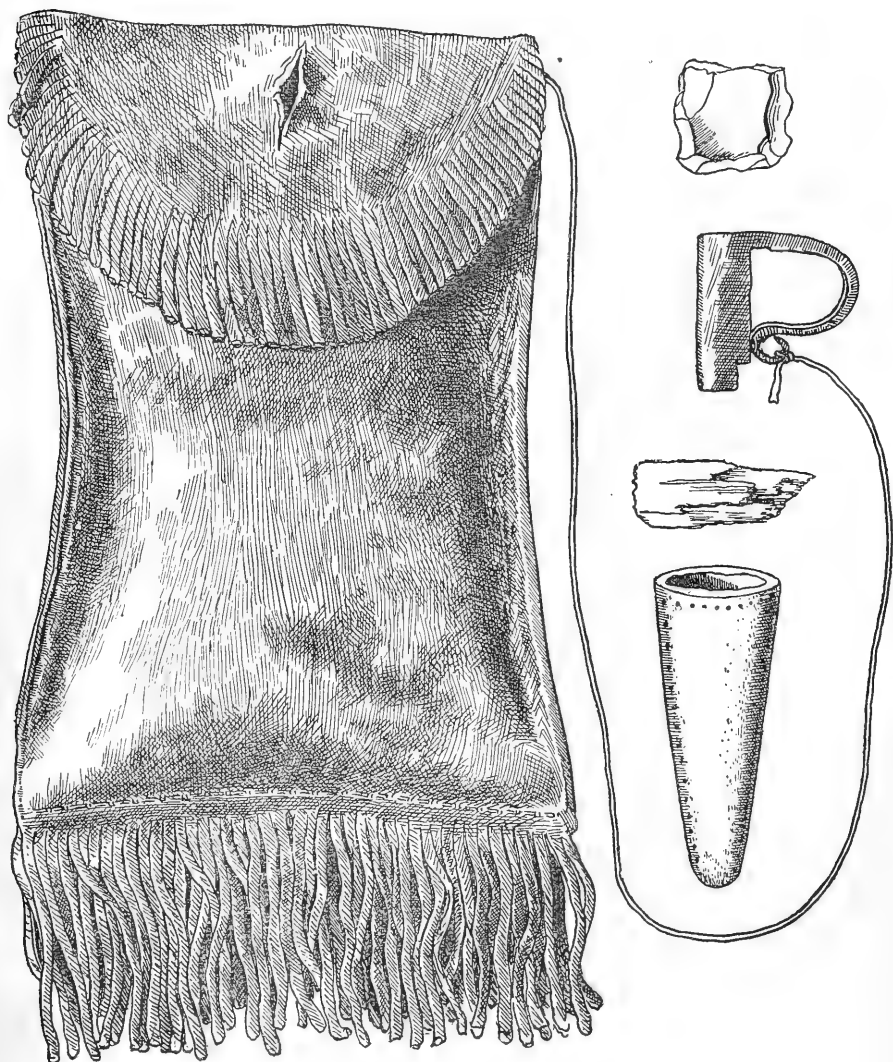


Fig. 52.

STRIKE-A-LIGHT (flint, steel, tinder-horn, spunk, and pouch).

(Cat. No. 22104, U. S. N. M. Cheyenne Indians, Arkansas. Collected by Dr. J. H. Barry.)

The Koords of Bhotan, Eastern Turkey, carry a pipe pouch containing besides flint, steel, and tinder, a pipe pick and a pair of pincers,

to transfer the lighted tinder to the pipe (fig. 55). The tinder is prepared from a fungus, probably *polyporus* species. The steel, shaped like an old-fashioned bell pull, is a very good form for holding in the hand.

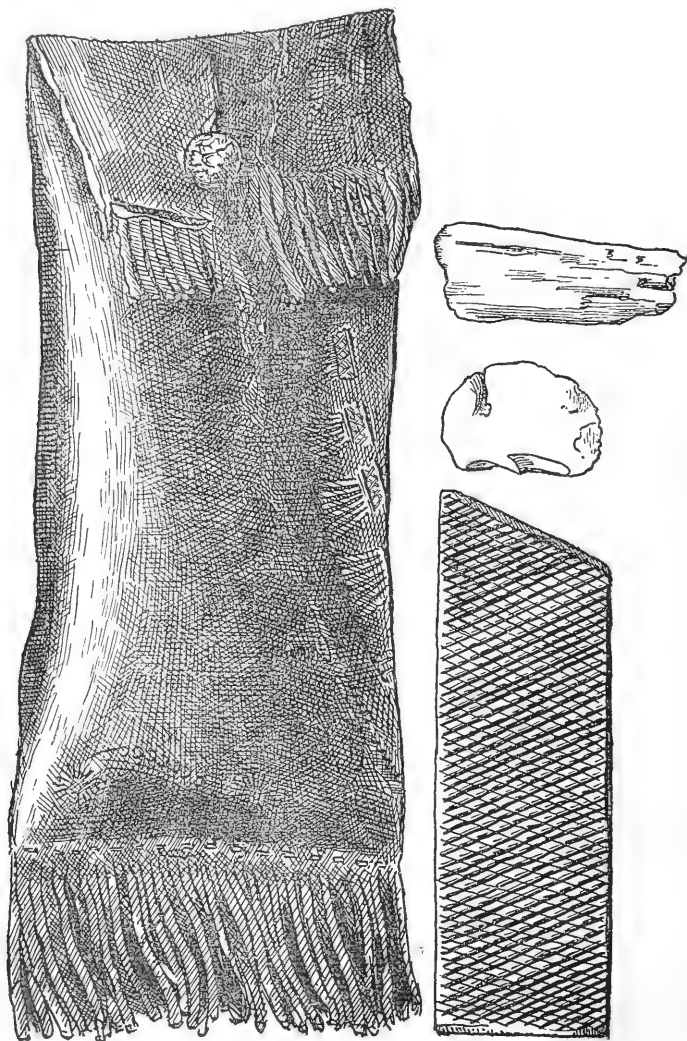


Fig. 53.

STRIKE-A-LIGHT. (Pouch for holding flint and steel.)

(Cat. No. 6972, U. S. N. M. Comanche Indians, Texas. Collected by Edward Palmer.)

The Chinese strike-a-light is the customary appendage to the pipe pouch. It is a very ingenious way of combining the steel with a pouch in which to keep the flint and tinder (fig. 56). In Thibet they are made very large and are finely decorated. One owned by Mr. W. W. Rockhill has a curving steel between 5 and 6 inches long, finely carved. The pouch was trimmed with encrusted silver set with jewels.

The Ainos of Japan use flint and steel for striking-a-light, this method having supplanted the generation of fire by sticks (p. 551.) This outfit shown (fig. 57, pl. LXXXI) is complete. The shoe-shaped steel is attached by a piece of sinew to the cork of a small wooden bottle containing the soft charcoal used as tinder. The flint is a small piece of ferruginous silex. With this set is a piece of stick which retains fire for a long time. It is the root of the *Ulmus campestris*, or *levis*, formerly used for the fire-drill (see fig. 17), but has come into a secondary place since the introduction of the flint and steel.

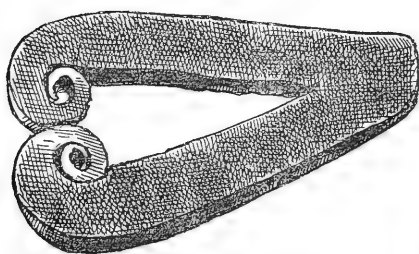
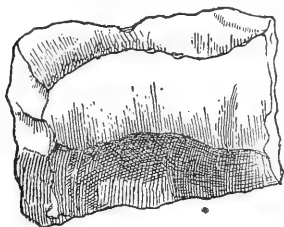


Fig. 54.

FLINT AND STEEL.

(Cat. No 126576, U. S. N. M. Guadalajara Indians, Mexico. Collected by Edward Palmer.)



Fig. 56.

STRIKE-A-LIGHT.

(Cat. No. 130311, U. S. N. M. China. Gift of George G. Fryer.)

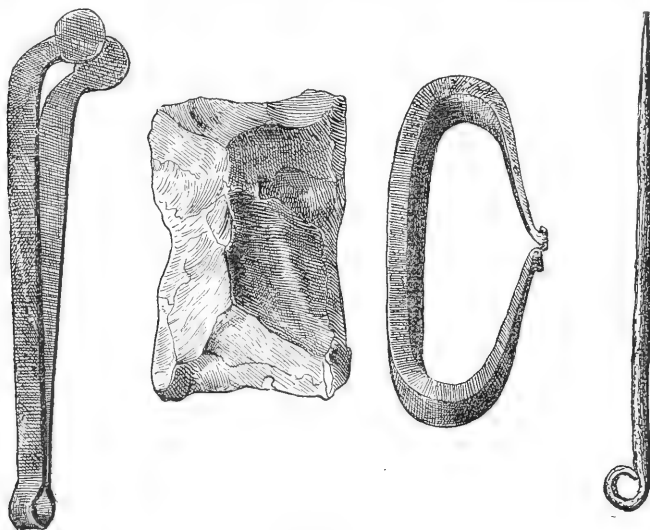


Fig. 55.

SMOKERS' PIPE-LIGHTING OUTFIT (showing flint, steel, pipe-pick, and pincers).

(Cat. No. 130607, U. S. N. M. Koords of Bhotan, eastern Turkey. Collected by Rev. A. N. Andrus.)

To strike a light the Aino takes out the cork with the steel attached and stirs up the tinder with the sharp point. He then holds up the

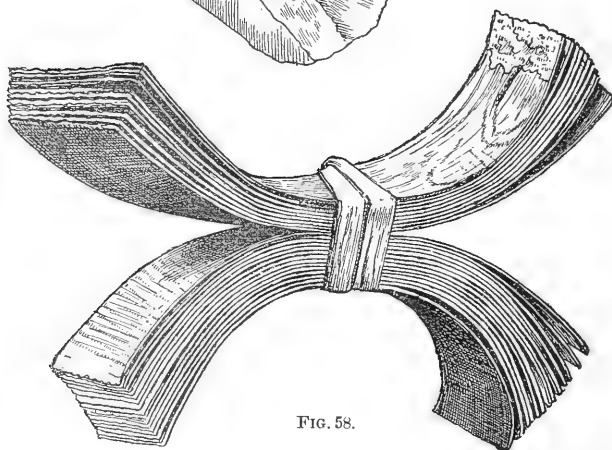
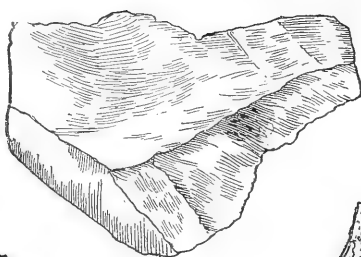
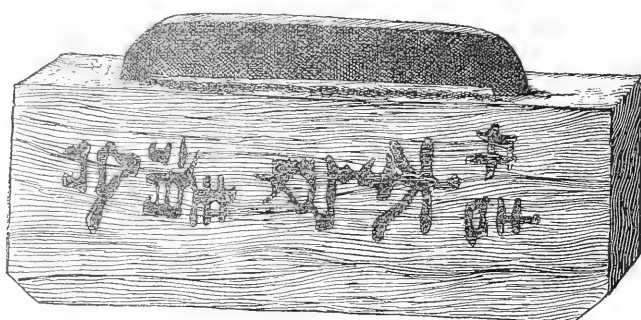


FIG. 58.

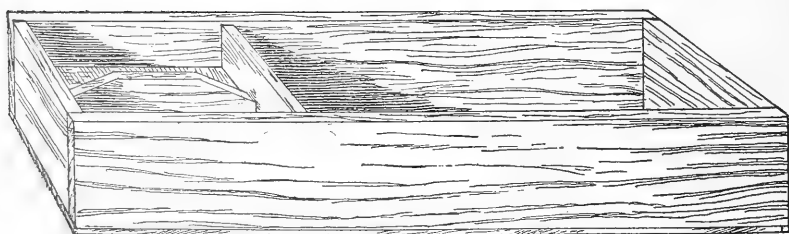


Fig. 58.

TINDER-BOX (showing mounted steel, flint, and bundle of shaving matches; box one-third natural size).

(Cat. No. 127137, U. S. N. M. Japan. Gift of the Japanese Department of Education, Tokio.)

flint in his hand over the box and strikes a spark down into it. He then transfers the coal to his pipe, or material for fire, or fire-stick, with

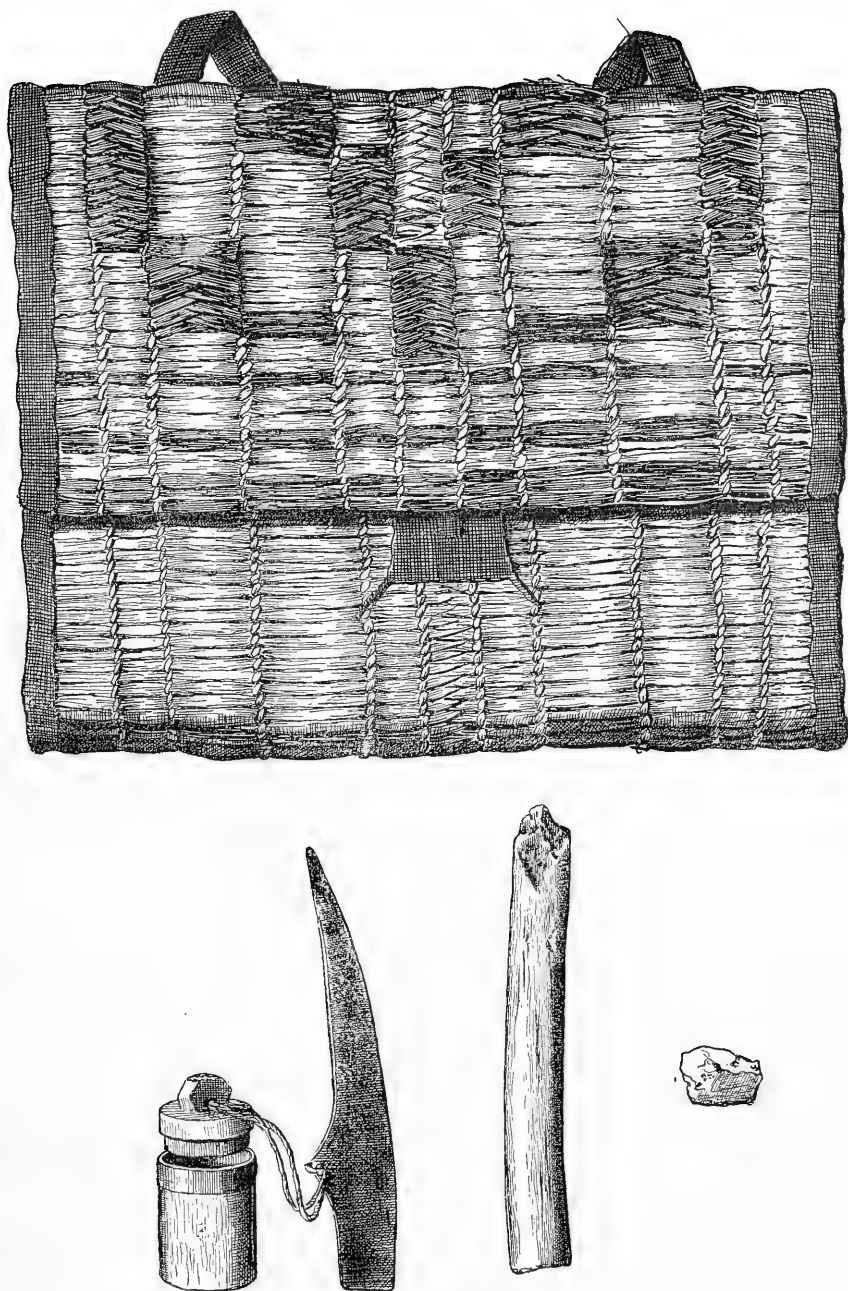


Fig. 57. STRIKE-A-LIGHT. Flint, steel, tinder-box, and rush-pouch. Cat. No. 22257, U. S. N. M. Ainos of Yezo, Japan. Collected by B. S. Lyman.

the point of the steel. These articles are kept in a rush pouch of twined weaving. A much ruder pouch of fishskin is in the Museum.

The Japanese tinder-box has two compartments, one with a damper for the tinder, and the other larger one for the flint and steel. This box is a familiar object in Japanese kitchens yet. The mounting of the steel in wood is an improvement on holding it between the fingers (fig. 58 and 59). No one it seems ever thought of so mounting the steel in Western countries. The matches are broad shavings tipped at both ends with sulphur, and are the Japanese rendering of the "spunks" used with our tinder-box.

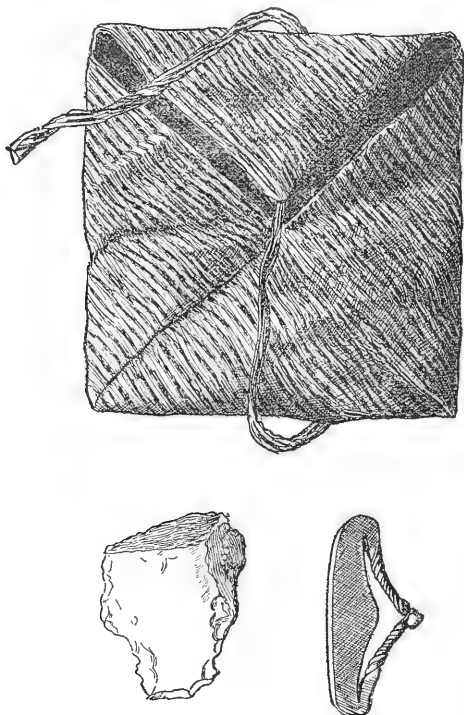


Fig. 60.

SMOKERS' STRIKE-A-LIGHT.

(Cat. No. 123133, U. S. N. M. Tokio, Japan. Gift of the Japanese Department of Education.)

Smokers in Japan carry a very small strike-a-light (fig. 60). The cloth pouch with a long flap that can be rolled around several times and tied, contains the three essentials, flint, steel, and tinder, the latter of burnt cotton.

List of specimens described and figured.

	Catalogue No.	Name.	Localities and Tribes.	Collector.
Text fig. 1	74379	Fire-making set	Sitkans, Alaska.	John J. McLean.
2	20644	.....do	Bella Bella, British Columbia.	James G. Swan.
3	127866	.....do	Quinaltets, Washington..	Charles Willoughby.
4	24096	.....do	Klamaths, Oregon	L. S. Dyar.
5	77193	.....do	Hupas, California	Lieut. P. H. Ray, U. S. Army.
6	19640	Hearth	Washoes, Nevada	Stephen Powers.
7	17230	Fire-making set	Pai-Utes, Southern Utah..	Maj. J. W. Powell.
8	11976	.....do .....	.....do	Do.
9	22022	.....do	Wind River Shoshones ..	Do.
10	128694	.....do	Mokis, Arizona	Mrs. Tilly E. Stevenson.
11	127708	.....do	Zuni, New Mexico	Col. James Stevenson.
12	69850	Slow match, punk .....	.....do	Do.
13	25268	Hearth from cave ..	Silver City, New Mexico..	Henry Metcalf.
14	130672	Hearth	Apaches, Arizona	Capt. Jno. G. Bourke, U. S. Army.
15	9555	Fire-making set	Navajos, New Mexico	Dr. E. Palmer.
16	15396	.....do	Costa Rica	W. M. Gabb.
17	129970	.....do	Ainos, Japan	Peabody Museum, D. P. Penhallow.
18	(*)	Sacred fire-drill	Idzumo, Japan	R. Hitchcock.
19	120971	Fire-making set	Somalis, East Africa	Peabody Museum, Dr. Chas. Pickering.
20	.....	Taveita men making fire.	.....	.....
Pl. LXXIV	10258	Fire tools	Frobisher Bay and Cumberland Gulf.	L. Kumlein.
21	9833			Capt. C. F. Hall.
22	10295			L. Kumlein.
23	14252			From Holm and Garde.
Text fig. 25	.....	Fire drill	East Greenland	Do.
Text fig. 26	.....	Boring set .....	.....do	Do.
Pl. LXXV	10128	Fire Bag	Holsteinberg, West Greenland.	Capt. C. F. Hall.
Text fig. 28	1978	Hearth with cement.	Mackenzie River	B. R. Ross.
Text fig. 29	1963	Hearth .....	.....do	Do.
Text fig. 30	1327	Fire drill	Anderson River	C. P. Gaudet.
Text fig. 31	89822	Fire-making set	Point Barrow, Alaska	Lieut. P. H. Ray, U. S. Army.
Pl. LXXVI	89500	Boring set .....	.....do	Do.
32	89630			
	89424			
Pl. LXXVII	25021	.....do	Sledge Island, Alaska	E. W. Nelson.
33	44978			
	45108			
Text fig. 34	33166	Fire-making set	Norton Sound, Alaska	Do.
Text fig. 35	38601	Hearth	Cape Vancouver, Alaska ..	Do.
Pl. LXXVIII	37961	Fire-making set	Chalitmute, Alaska	Do.
36	36325			
Pl. LXXIX	127520	.....do	Kassianamute, Alaska	I. Applegate.
Text fig. 38	127819a	.....do	Koggiung, Bristol Bay, Alaska.	W. J. Fisher.
Text fig. 39	127819b	.....do .....	.....do	Do.

* From photograph.

List of specimens described and figured—Continued.

	Catalogue No.	Name.	Localities and Tribes.	Collector.
Pl. LXXX 40	55938	Fire-making set	Bristol Bay, Alaska	Charles L. McKay.
Text fig. 41	72514	Hearth and drill....	Kadiak Island, Alaska ...	W. J. Fisher.
Text fig. 42	129775	Fire sticks (model)	Malays	After Wallace.
Text fig. 43	130675	.....do	Samoa	Harold M. Sewall.
Text fig. 44	1861	Strike-a-light	Fort Simpson, British Columbia.	B. R. Ross.
Text fig. 45	128405	.....do	Mackenzie River District.	E. P. Herendeen.
Text fig. 46		.....do	Mackenzie River District.	E. P. Herendeen.
Text fig. 47		.....do	Mackenzie River District.	E. P. Herendeen.
Text fig. 48	75516	Tinder-box	England	L. and M. Farmer.
Text fig. 49	130431	Wheel tinder-box...	Broadalbin, New York ...	F. S. Hawley.
Text fig. 50	129693	Strike-a-light	Boulogne-sur-mer, France	Edward Lovett.
Text fig. 51	22431	Flint and steel	Otoes, Kansas	J. W. Griest.
	8481	Belt with flint, steel, etc.	Assiniboinés, Dakota	Dr. J. P. Kimball.
Text fig. 52	22104	Strike-a-light	Cheyennes, Arkansas.....	Dr. W. H. Barry.
Text fig. 53	6972	.....do	Comanches, Texas	Dr. E. Palmer.
Text fig. 54	126576	Flint and steel	Guadalajara Indians, Mexico.	Do.
Text fig. 55	130607	Pipe-lighting outfit	Koords, East Turkey.....	Rev. A. N. Andrus.
Text fig. 56	130311	Strike-a-light	China	George G. Fryer.
Pl. LXXXI 57	22257	.....do	Ainos, Japan	B. S. Lyman.
Text fig. 58	128137	Tinder-box	Japan	Japanese Department of Education.
Text fig. 59		.....do	Japan	Japanese Department of Education.
Text fig. 60	128138	Strike-a-light .....	.....do	Do.

THE COLLECTION OF KOREAN MORTUARY POTTERY IN THE U. S. NATIONAL MUSEUM.

By PIERRE LOUIS JOUY.

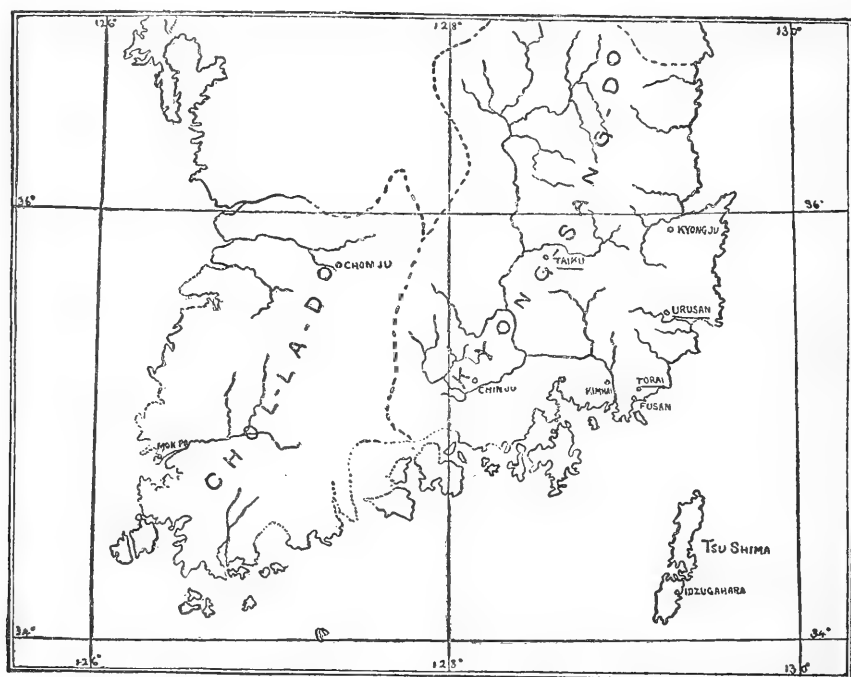
On arriving in Fusan, in the winter of 1883, my attention was early attracted to the subject of Korean pottery, and several pieces of a ware entirely different from the ordinary pottery of the country were brought to me for examination by Japanese residents. These pieces, to which a remote antiquity was ascribed, were held in high esteem by Japanese connoisseurs who delight in rare and curious objects. An extraordinary value was given to fine specimens and they were often sent to friends in Japan, and especially to Osaka, which port has long enjoyed direct communication with Korea.

The discoveries of Professor Morse in Japan* and the researches of Japanese archaeologists in bringing to light the ancient stone implements and numerous other prehistoric objects, including pottery, had inspired me with the desire to form similar collections in Korea. This seemed all the more encouraging as the country was not only practically a virgin field of research, but abounded in monuments of great antiquity and evidences of long occupation of the soil. Korea is one vast graveyard. Burial mounds and monuments of varying age and rich in archaeological interest are a prominent feature of the landscape. Although a tolerably thickly populated country there are many sections where the cemeteries occupy at least a quarter as much space as that used for agricultural purposes. From the capital to the southeastern coast, a distance of about 200 miles, they are scarcely ever out of sight of the traveler, their prominent position on the hillsides making them very conspicuous. Isolated graves of greater distinction are of frequent occurrence and are tended from generation to generation with great care. The grass is kept well cropped to avoid danger from fire, and a grove of evergreen trees surrounds the grave. These groves, frequently the only trees on a hillside, are arranged in the shape of a horseshoe, the mound, from four to five feet high, being in the center, and the open space on the lower side.

* The Shell Mounds of Omori. Tokio, 1879.

Some mounds are further protected by a wall on three sides still following the shape of a horseshoe, and the open side is guarded by nearly life-sized effigies in stone arranged in pairs on each side of a slab of granite on which is carved an inscription.

Most graves, however, have simply an upright slab of granite, rectangular in shape, bearing an inscription, and supported by a low pedestal.



SKETCH MAP OF SOUTHERN KOREA.

(Places underscored show where mortuary pottery has been found.)

Owing to the recent opening of the country and the utter impossibility for a foreigner to evade the curious eyes of the natives for any length of time, it was well-nigh impossible to accomplish any original investigations. I therefore considered myself fortunate in securing the services of a young native who from time to time brought me many specimens of pottery and other objects which he described as having taken from the earth buried in the ancient graves near the cities of Taiku, Uru-san, and Torai. Among other objects, besides pottery, were rings of copper heavily gilded, parts of bronze horse-trappings, such as buckles and other ornaments, and objects of stone; the most interesting of these objects were arrowheads of slate, and daggers of slate or shale with the handle and blade in one piece. These latter are considerably weathered, showing signs of great age, but were described as having been taken from stone coffers in the graves, which would account for their almost perfect state of preservation.

The pottery in common use in Korea at the present time consists of three kinds; the finest of white, pale buff, or bluish, porcelain sometimes decorated in blue and with a high glaze, is used for the table, and consists of dishes, bowls, and bottles, also wash basins; the second quality is a pale yellow ware, glazed, mostly made into bowls, undecorated, and used by the poorer classes. It is very similar to the common kitchen ware in use all over the world in civilized as well as barbarous kitchens. The third style of pottery is of the commonest kind, made of dark brown, or reddish earth, is glazed inside and out, and has little or no decoration except a wavy line produced by wiping off the glaze, leaving the lighter under surface to show through. Some pieces have their edges scalloped or fluted and are adorned with incised lines, but generally they are quite plain and without these ornamentations. This ware, of which a specimen is shown in this collection (an oil-bottle, No. 94519), is used mainly for oil and water jars and for the common bowls and dishes of the Korean kitchen. House tiles are also made of this clay.

The most ambitious specimens of this latter ware I have seen are the water jars, huge vessels suggesting possibilities of concealment as great as the famous jars in the Arabian tale*; these are often greater in capacity than an ordinary barrel. There are generally at least two of these huge receptacles placed just outside of the kitchen door. Another curious form is a kind of oven consisting of a shallow vessel with a cover and raised some 8 or 10 inches from the ground on three legs, the whole being made of pottery.

The specimens of ancient Korean pottery, enumerated in the following list, which I have called *mortuary pottery*, are unglazed (a few pieces show apparently accidental glazing in splashes); they range in color from a dull bluish or slate color to dark brown or light red. In form they are archaic, containing many shapes not seen in the modern pottery of the country. In some cases they closely resemble the ancient Etruscan, notably in the various styles of *tazza*, a shallow goblet on a stem supported by a flaring base; sometimes they are provided with handles, but more frequently are without them.

This pottery is of various styles of workmanship, some pieces being modeled by the hand, others paddled into shape by an instrument, others turned on the wheel,† while the larger and more elaborate pieces

*In southern China, in the vicinity of Hong-Kong, similar jars, though not quite so large, are used for burial purposes in place of a coffin.

†The Korean potter's wheel consists of a circular table from 2 to 3 feet in diameter and 4 to 6 inches thick, made of heavy wood so as to aid in giving impetus to it when revolving. In general appearance it is not very unlike a modeler's table. This arrangement is sunken into a depression in the ground, and revolves easily by means of small wheels working on a track underneath, the table being pivoted in the center. The wheel is operated directly by the foot, without the aid of a treadle of any kind. The potter sits squatting in front of the wheel, his bench or seat on a level with it, and space being left between his seat and the wheel to facilitate his movements. With his left foot underneath him, he extends his right foot and strikes the side of the wheel with the bare sole of the foot, causing it to revolve.—The Korean Potter's Wheel: P. L. Jouy. Science: September 21, 1888, p. 144.

show all of these methods combined. Many of the ancient shapes, although of great beauty and utility, are not seen in the modern ware which is far inferior to it in gracefulness of design and variety of pattern of vessel. For instance, the handled mug, which is quite a common shape in the mortuary vessels, is not seen at all among modern Korean, or indeed among Oriental vessels in general, except where it is of obviously modern introduction.

The decoration of these vessels is in incised lines, in most cases made by a comb-shaped instrument; simple geometrical patterns and cross-hatching is also seen; also dots, and excisions which ornament the bases of the jars and the covers of some of the vessels.

Inquiry among the educated classes elicited the information that these vessels were made in ancient times to hold offerings to the dead, and were interred in the grave with the body, and that this practice obtained up to about the twelfth century.

A similar custom prevailed in southern Japan, and the vessels were, moreover, of almost exactly similar shapes and style of ornamentation as shown in Nos. 94520-1 and 94520-2 of this collection, specimens obtained from Nara, the ancient capital of Japan. In the collection of Mr. W. Gowland, late superintendent of the Imperial mint at Osaka, Japan, and in the national collections in Tokio are many examples of pottery taken from graves in Yamato which could be duplicated in this Korean collection.

The present series and the collection in possession of the writer are the only specimens of Korean mortuary pottery that I have any knowledge of in this country.

In plate LXXXVI are shown, besides the example of Korean ware, an oil-bottle, No. 94519; two specimens of ancient Japanese mortuary pottery; also examples of Etruscan and Roman pottery showing two styles of *tazza*, the "tulip-shaped" vessel and the handled mug; but of especial interest is the Roman vessel, No. 136549, in the center, which has a base ornamented with the triangular openings of exactly similar design as those seen in the Korean ware.

Catalogue of the Korean Mortuary Pottery in the National Museum, Collection of P. L. Jouy.

[NOTE: In the following list the figures in the plates are referred to as being on the upper, middle, or lower line, the figures counting from the left.]

Earthen pot. Brown ware, glazed, possibly warped in firing. The entire outer surface is covered with a reticulated pattern. Height, $11\frac{1}{2}$ inches; diameter, $11\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-1. Pl. LXXXII, fig. 3, lower line.

Earthen pot. Dark brown ware. The entire outer surface of body and shoulder is covered with a reticulated pattern of small squares. Height, $10\frac{1}{2}$ inches; diameter, $11\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-2. Pl. LXXXII, fig. 2, lower line.

- Earthen pot.* Yellowish gray ware, washed with a brown slip, if not glazed. The lower part of the body is covered with indented short lines. It is ornamented by a band of four incised waved lines made with a comb. Two similar bands ornament the shoulder, and another the neck. Height, 10 $\frac{3}{4}$ inches; diameter, 18 $\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-3. Pl. LXXXII, fig. 4, lower line.
- Earthen pot.* Dark brown ware, unglazed. Height, 11 $\frac{1}{2}$ inches; diameter, 11 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-4. Pl. LXXXII, fig. 3, upper line.
- Earthen pot.* Dark brown ware, unglazed. Ornamented with a beaded molding. Height, 8 inches; diameter, 9 inches. Southeastern Korea; U. S. N. M. No. 94518-5.
- Earthen pot.* Gray ware, unglazed. It is ornamented with a reticulated pattern. Height, 7 $\frac{1}{2}$ inches; diameter, 9 inches. Southeastern Korea; U. S. N. M. No. 94518-6. Pl. LXXXII, fig. 5, lower line.
- Earthen pot.* Slate-colored ware, unglazed. Height, 7 $\frac{3}{4}$ inches; diameter, 8 $\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-7. Pl. LXXXII, fig. 1, lower line.
- Earthen pot.* Brown ware, unglazed. The lower half of the body of this vessel is similar in ornamentation to No. 3. The shoulder is ornamented with double-grooved lines. Height, 4 $\frac{3}{4}$ inches; diameter, 7 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-8. Pl. LXXXIII, fig. 4, upper line.
- Earthen pot.* Brownish gray ware, washed with a slate-colored slip. Height, 7 inches; diameter, 7 inches. Southeastern Korea; U. S. N. M. No. 94518-9. Pl. LXXXII, fig. 2, upper line.
- Earthen Pot.* Yellow ware, unglazed, and lightly fired. Height, 7 inches; diameter, 7 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-10.
- Earthen pot.* Brown ware, glazed inside and out with a ferric-silicate glaze, now remaining in small patches around the neck, and inside on the bottom. Height, 5 $\frac{1}{2}$ inches; diameter, 5 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-11.
- Earthen pot.* Gray ware, glazed. Two small disks of clay are attached to opposite sides of the body. Height, 5 $\frac{1}{2}$ inches; diameter, 6 inches. Southeastern Korea; U. S. N. M. No. 94518-12. Pl. LXXXII, fig. 5, upper line.
- Earthen pot.* Gray ware, unglazed, and lightly fired, ornamented with light, grooved lines. The neck is ornamented with beaded moldings, also with a band of incised, waved lines (made with a comb having 16 teeth) between the moldings. Height, 7 $\frac{1}{2}$ inches; diameter, 7 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-13.
- Earthen pot.* Gray ware, lightly fired, washed with a slate-colored slip, ornamented with a beaded molding, and two bands of incised waved lines, made with a comb. Height, 6 $\frac{1}{4}$ inches; diameter, 5 $\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-14.
- Earthen pot.* Brown ware, glazed, and ornamented with a band of incised waved lines made with a comb. Neck ornamented with three beaded moldings. Height, 6 $\frac{1}{4}$ inches; diameter, 5 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-15. Pl. LXXXIII, fig. 2, upper line.
- Earthen pot.* Brown ware, well fired, and washed with a slate-colored slip. Body with an indented bottom, ornamented at its greatest diameter with two bands of waved incised lines made with a comb having 3 or 4 teeth. The shoulder is covered with light waved lines made with a comb. The neck is ornamented with two beaded moldings, and three bands of waved, incised lines similar to those on the body. Height, 7 $\frac{1}{4}$ inches; diameter, 5 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-16.
- Earthen pot.* Brown ware, outside washed with a brown slip, inside glazed. Ornamented with a beaded molding, and a wide band of waved lines made with a comb. Height, 6 $\frac{3}{4}$ inches; diameter, 5 $\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-17.

- Earthen pot.* Brown ware, vitrified in firing. Ornamented with three bands of waved, incised lines. Height, 9 inches; diameter, $7\frac{5}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-18.
- Earthen vase on stand.* Brown ware washed with a slate-colored slip, unglazed, ornamented with beaded molding and two bands of waved incised lines made with a comb having three or four teeth. The stand is warped in firing. Height 10 inches; diameter $7\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M., No. 94518-19.
- Earthen vase on stand with cover.* Slate-colored ware. Outside of body and inside of mouth glazed with a greenish ferric-silicate glaze. Shoulder and neck ornamented with beaded moldings. The stand is ornamented with beaded moldings and perforated with six triangular openings. The cover is also marked with indentations, and glazed inside and out. Height, $10\frac{3}{8}$ inches; diameter, $7\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-20.
- Earthen bowl on stand.* Grayish brown ware, glazed outside. The bowl has its entire outer surface covered with indentations like No. 3, but these have been partly effaced from the sides. The sides are ornamented with beaded moldings and two bands of incised zigzag lines. Height, $8\frac{1}{2}$ inches; diameter, $10\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-21. Pl. LXXXII, fig. 4, upper line.
- Earthen bowl on stand.* Brown ware, washed with a brown slip. The sides and lips are ornamented with beaded moldings, between which are bands of waved incised lines made with a comb. The stand is ornamented like the bowl, and also has two rows of six triangular openings. Height, $10\frac{1}{2}$ inches; diameter, $12\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-22. Pl. LXXXIII, fig. 4, lower line.
- Earthen bowl or cup on stand, handled.* Brown ware, washed outside with dark brown slip. The bowl is ornamented with two bands of prominent beaded moldings, between which is a band of waved incised lines made with a comb having four teeth. The handle is small and flat. The stand is molded; its sides are pierced with six openings. Height, $5\frac{1}{2}$ inches; diameter, $5\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-23. Pl. LXXXV, fig. 4, lower line.
- Earthen bowl or cup with two handles.* Brown ware, washed with a dark brown slip on the outside. The bowl is ornamented with three bands of waved incised double lines cut so deeply as to raise a bur. The handles are small and flat, placed on opposite sides. The lip is shouldered for a cover, which is missing. Height, 4 inches; diameter, 6 inches. Southeastern Korea; U. S. N. M. No. 94518-24.
- Earthen pot-shaped vessel on stand, with cover.* Slate-colored ware. The stand is pierced with five rectangular openings. The cover is slightly convex, with a small knob in its center. Height, $6\frac{1}{2}$ inches; diameter, $6\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-25. Pl. LXXXII, fig. 1, upper line.
- Earthen pot-shaped vessel with handle and cover.* Gray ware, washed with a slate-colored slip. Body ornamented with three beaded moldings. The handle is round and looped. The cover is convex, with a knob. Its rim is made to encircle the lip of the vessel. Height, $5\frac{1}{2}$ inches; diameter, $4\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-26.
- Earthen pot with handle.* Brown ware, washed with a slate-colored slip. Height, $3\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-27. Pl. LXXXV, fig. 5, lower line.
- Earthen jar with cover and handle.* Brown ware, washed with a slate-colored slip. The body is ornamented with a band of incised waved lines, between beaded moldings. Height, 8 inches; diameter, $8\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-28.
- Earthen jar on stand.* Slate-colored ware, unglazed. Body ornamented with a band of incised waved lines made with a comb having five teeth. This band is between two beaded moldings. The shoulder is ornamented like the body. The neck has beaded moldings around the lower part. Height, $10\frac{3}{8}$ inches; diameter, $9\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-29. Pl. LXXXIII, fig. 5, upper line.

- Earthen bowl.* Slate-colored ware, washed with a yellow slip and lightly fired; unglazed. Height, $4\frac{5}{8}$ inches; diameter, $5\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-30. Pl. LXXXIII, fig. 7, upper line.
- Earthen cup or tumbler.* Gray ware, glazed dark brown inside and out. Ornamented with three beaded moldings. Height, $1\frac{3}{4}$ inches; diameter, $3\frac{5}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-31. Pl. LXXXV, fig. 3, middle line.
- Earthen cup on a stand.* Slate-colored ware, unglazed, and well fired. Height, $2\frac{5}{8}$ inches; diameter, $2\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-32. Pl. LXXXIV, fig. 1, upper line.
- Earthen cup on a ring base.* Gray ware, unglazed. Height, $1\frac{1}{2}$ inches; diameter, $2\frac{5}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-33.
- Earthen cup.* Dark brown ware, washed with a brown slip. Height, 2 inches; diameter, $3\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-34.
- Earthen box with cover.* Dark red ware washed with a dark brown slip. Height, $1\frac{1}{2}$ inches; diameter, $4\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-35. Pl. LXXXV, fig. 2, upper line.
- Earthen bowl.* Slate-colored ware, unglazed and warped in firing. The bowl is ornamented with incised lines. Height, $2\frac{1}{4}$ inches; diameter, 5 inches. Southeastern Korea; U. S. N. M. No. 94518-36.
- Earthen bottle.* Slate-colored ware, unglazed. Neck encircled with a beaded molding. Height, 3 inches; diameter, $2\frac{7}{8}$ inches. The throat is one-half inch in diameter. Southeastern Korea; U. S. N. M. No. 94518-37. Pl. LXXXV, fig. 1, middle line.
- Earthen tazza.* Slate-colored ware. An incised triangle with a perpendicular line intersecting its apex is cut on the stand just below the bowl. Height, 5 inches; diameter, $6\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-38. Pl. LXXXIV, fig. 3, middle line.
- Earthen tazza.* Slate-colored ware, unglazed. In form similar to the preceding, except that the stand is pierced with two rows of four rectangular openings. Height, 5 inches; diameter, $5\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-39. Pl. LXXXIV, fig. 4, middle line.
- Earthen bowl.* Slate-colored ware, unglazed. Height, $5\frac{3}{8}$ inches; diameter, $4\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-40. Pl. LXXXIV, fig. 3, upper line.
- Earthen tazza.* Slate-colored ware similar to No. 38 in form except that the edge is shouldered to receive a cover and the stand is pierced with but one row of three long triangular openings. Height, $4\frac{1}{2}$ inches; diameter, 6 inches. Southeastern Korea; U. S. N. M. No. 94518-41. Pl. LXXXIV, fig. 6, middle line.
- Earthen tazza.* Slate-colored ware. Height, 4 inches; diameter, $5\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-42.
- Earthen tazza without handles.* Similar to preceding. Height, $2\frac{3}{4}$ inches; diameter, 4 inches. Southeastern Korea; U. S. N. M. No. 94518-43. Pl. LXXXIV, fig. 6, upper line.
- Earthen tazza.* Slate-colored ware, unglazed. Height, 7 inches; diameter, 6 inches. Southeastern Korea; U. S. N. M. No. 94518-44. Pl. LXXXIV, fig. 3, lower line.
- Earthen tazza with cover.* Slate colored ware with a brown glaze. Height, $5\frac{1}{4}$ inches; diameter, $5\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-45. Pl. LXXXIV, fig. 5, lower line.
- Earthen tazza.* Slate-colored ware. Height, $4\frac{1}{4}$ inches; diameter, $4\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-46. Pl. LXXXIV, fig. 2, middle line.
- Earthen bowl on stand with cover.* Gray ware, lightly fired. The bowl is decorated with beaded moldings and a band of incised circles. The cover is also ornamented with a band of incised circles, and a band of barred triangles between two circles. Height, $5\frac{1}{2}$ inches; diameter, $5\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-47. Pl. LXXXIV, fig. 1, middle line.

- Earthen tazza with cover.* Slate-colored ware, unglazed. Height, $4\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches. Southeastern Korea; U. S. N. M. No. 94518-48. Pl. LXXXIV, fig. 2, upper line.
- Earthen tazza with cover.* Slate-colored ware glazed brown. The cover is ornamented with incised circles grouped by threes, and with diagonal dotted lines between the first and second, and second and third groups. Height, 7 inches; diameter, $5\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-49. Pl. LXXXIV, fig. 4, lower line.
- Earthen tazza.* Slate-colored ware, unglazed. Height, $4\frac{1}{2}$ inches; diameter, $5\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-50. Pl. LXXXIV, fig. 6, lower line.
- Earthen tazza.* Slate-colored ware, glazed a dark brown. Height, $5\frac{3}{8}$ inches; diameter, $5\frac{5}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-51. Pl. LXXXIV, fig. 1, lower line.
- Earthen pot.* Brown ware, unglazed. Height, $7\frac{3}{8}$ inches; diameter, $7\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-52.
- Earthen pot.* Dark brown ware, unglazed. Height, $6\frac{1}{4}$ inches; diameter, $7\frac{3}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-53.
- Earthen pot.* Slate-colored ware, unglazed. Height, $5\frac{1}{4}$ inches; diameter, $5\frac{7}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-54. Pl. LXXXIII, fig. 1, upper line.
- Earthen pot.* Slate-colored ware, unglazed. Height, 5 inches; diameter, 5 inches. Southeastern Korea; U. S. N. M. No. 94518-55.
- Earthen jar, stand broken off and missing.* Slate-colored ware, unglazed. Ornamented just below the shoulder with two bands of waved incised lines made with a comb having nine teeth. Neck ornamented with two bands of waved incised lines and four beaded moldings. Height, $9\frac{1}{4}$ inches; diameter, $8\frac{3}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-56.
- Earthen jar on stand.* Slate-colored ware glazed yellow, badly warped and blistered in firing. Ornamented with grooved lines. Neck with beaded moldings. Height, $13\frac{1}{2}$ inches; diameter, $10\frac{1}{4}$ inches. Southeastern Korea; U. S. N. M. No. 94518-57.
- Earthen stand.* Terra cotta, colored with a brown slip. Unglazed; ornamented with moldings and a band of incised waved lines made with a comb. The top is dish-shaped, $7\frac{1}{4}$ inches in diameter, the bowl ornamented with beaded molding about an inch from the lip. The stand is open from top to bottom. Height, 14 inches; diameter, 8 inches. Southeastern Korea; U. S. N. M. No. 94518-58.
- Earthen flower stand.* Brown ware, unglazed. Height, $6\frac{1}{4}$ inches; diameter, $8\frac{5}{8}$ inches. Southeastern Korea; U. S. N. M. No. 94518-59. Pl. LXXXV, fig. 3, lower line.
- Earthen cup with handle.* Terra cotta ware, unglazed. Height, $2\frac{7}{8}$ inches; diameter, 4 inches. Southeastern Korea; U. S. N. M. No. 94518-60. Pl. LXXXV, fig. 4, middle line.
- Earthen oil-bottle.* Modern Korean pottery. Terra cotta ware, glazed dark brown. It is ornamented with two grooved lines where the neck springs from the body, and a beaded molding around the middle of the neck. The glaze is wiped off in wide curved lines and dashes from the shoulder. Height, 15 inches; diameter, $7\frac{1}{2}$ inches. Torai, Korea; U. S. N. M. No. 94519. Pl. LXXXVI, fig. 2, upper line.
- Earthen vase on a stand.* Gray earthen ware unglazed. The body of the vessel is ornamented with light grooved parallel lines made with a comb. The shoulder is covered with a scale pattern of light incised lines made with a comb. Height, $6\frac{3}{4}$ inches; diameter, $3\frac{7}{8}$ inches. Nara, Japan; U. S. N. M. No. 94520-1. Pl. LXXXVI, fig. 1, upper line.
- Earthen bottle.* Terra cotta ware, unglazed. The lower part of the body appears to have been pared with a knife. Height, $3\frac{3}{4}$ inches; diameter, $3\frac{1}{2}$ inches. Nara, Japan; U. S. N. M. No. 94520-2. Pl. LXXXVI, fig. 3, upper line.

EXPLANATION OF PLATE LXXXII.

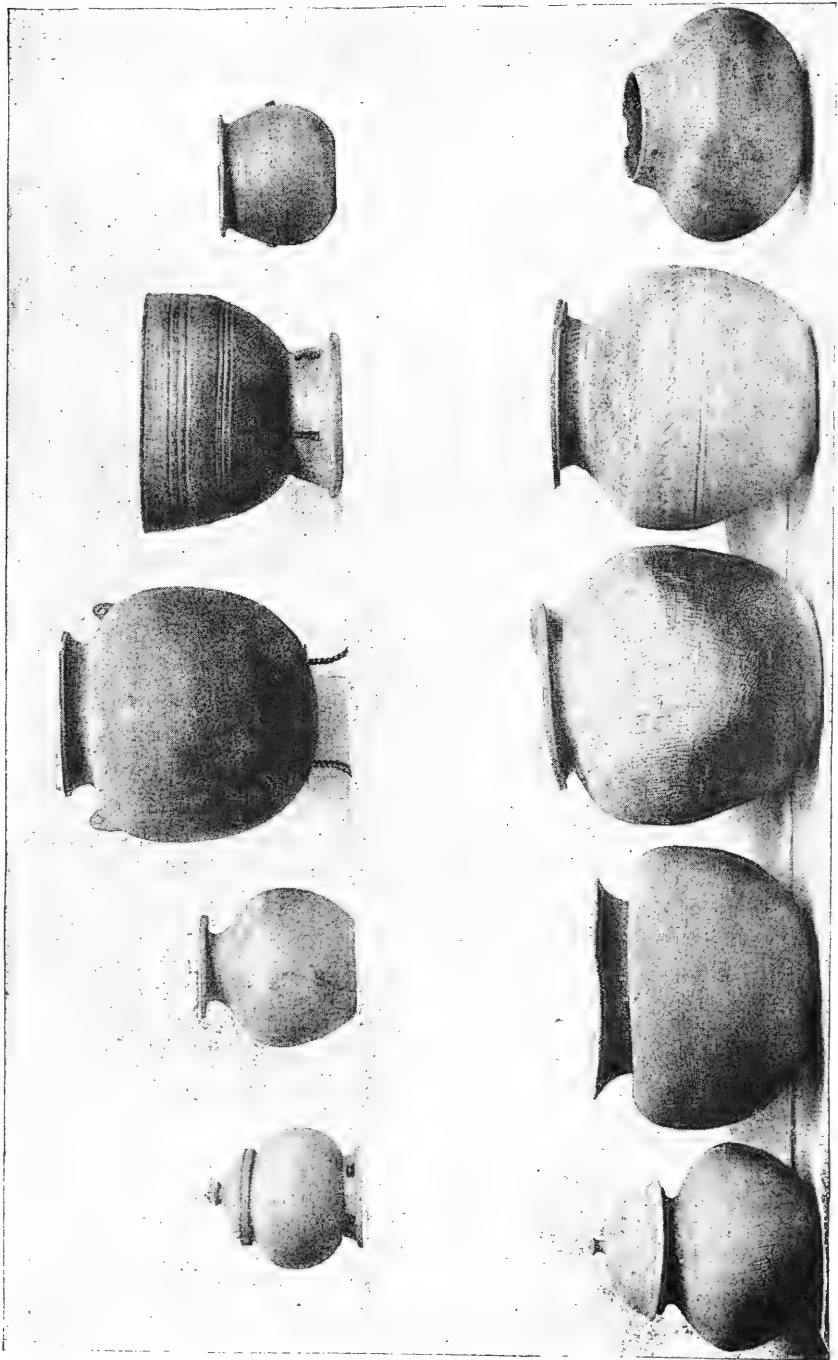
KOREAN MORTUARY POTTERY.

(Upper line, commencing at the left.)

- Fig. 1. EARTHEN POT-SHAPED VESSEL ON STAND, WITH COVER. Slate-colored ware. The stand is pierced with five rectangular openings. The cover is slightly convex, with a small knob in its center. Height, $6\frac{1}{2}$ inches; diameter, $6\frac{3}{8}$ inches. (Cat. No. 94518-25, U. S. N. M. Southeastern Korea.)
- Fig. 2. EARTHEN POT. Brownish gray ware; washed with a slate-colored slip. Height, 7 inches; diameter, 7 inches. (Cat. No. 94518-9, U. S. N. M. Southeastern Korea.)
- Fig. 3. EARTHEN POT AND COVER. Dark brown ware; unglazed. Height, $11\frac{1}{2}$ inches; diameter, $11\frac{3}{8}$ inches. (Cat. No. 94518-4, U. S. N. M. Southeastern Korea.)
- Fig. 4. EARTHEN BOWL ON STAND. Grayish brown ware; glazed outside. The bowl has its entire outer surface covered with indentations like No. 3, but these have been partly effaced from the sides. The sides are ornamented with beaded moldings and two bands of incised zigzag lines. Height, $8\frac{1}{2}$ inches; diameter, $10\frac{1}{4}$ inches. (Cat. No. 94518-21, U. S. N. M. Southeastern Korea.)
- Fig. 5. EARTHEN POT. Gray ware; glazed. Two small disks of clay are attached to opposite sides of the body. Height, $5\frac{1}{4}$ inches; diameter, 6 inches. (Cat. No. 94518-12, U. S. N. M. Southeastern Korea.)

(Lower line, commencing at the left.)

- Fig. 1. EARTHEN POT. Slate-colored ware; unglazed. Height, $7\frac{3}{8}$ inches; diameter, $8\frac{1}{2}$ inches. (Cat. No. 94518-7, U. S. N. M. Southeastern Korea.)
- Fig. 2. EARTHEN POT. Dark brown ware. The entire outer surface of body and shoulder is covered with a reticulated pattern of small squares. Height, $10\frac{1}{4}$ inches; diameter, $11\frac{1}{2}$ inches. (Cat. No. 94518-2, U. S. N. M. Southeastern Korea.)
- Fig. 3. EARTHEN POT. Brown ware; glazed. Possibly warped in firing. The entire outer surface is covered with a reticulated pattern. Height, $11\frac{1}{2}$ inches; diameter, $11\frac{1}{4}$ inches. (Cat. No. 94518-1, U. S. N. M. Southeastern Korea.)
- Fig. 4. EARTHEN POT. Yellowish gray ware; washed with a brown slip, if not glazed. The lower part of the body is covered with indented short lines. It is ornamented by a band of four incised waved lines made with a comb. Two similar bands ornament the shoulder, and another the neck. Height, $10\frac{3}{8}$ inches; diameter, $18\frac{5}{8}$ inches. (Cat. No. 94518-3, U. S. N. M. Southeastern Korea.)
- Fig. 5. EARTHEN POT. Gray ware; unglazed. It is ornamented with a reticulated pattern. Height, $7\frac{1}{2}$ inches; diameter, 9 inches. (Cat. No. 94518-6, U. S. N. M. Southeastern Korea.)



KOREAN MORTUARY POTTERY.

EXPLANATION OF PLATE LXXXIII.

KOREAN MORTUARY POTTERY.

(Upper line, commencing at the left.)

Fig. 1. EARTHEN POT. Slate-colored ware; unglazed. Height, $5\frac{1}{4}$ inches; diameter, $5\frac{3}{8}$ inches. (Cat. No. 94518-54, U. S. N. M. Southeastern Korea.)

Fig. 2. EARTHEN POT. Brown ware; glazed and ornamented with a band of incised waved lines made with a comb. Neck ornamented with three beaded moldings. Height, $6\frac{1}{4}$ inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-15, U. S. N. M. Southeastern Korea.)

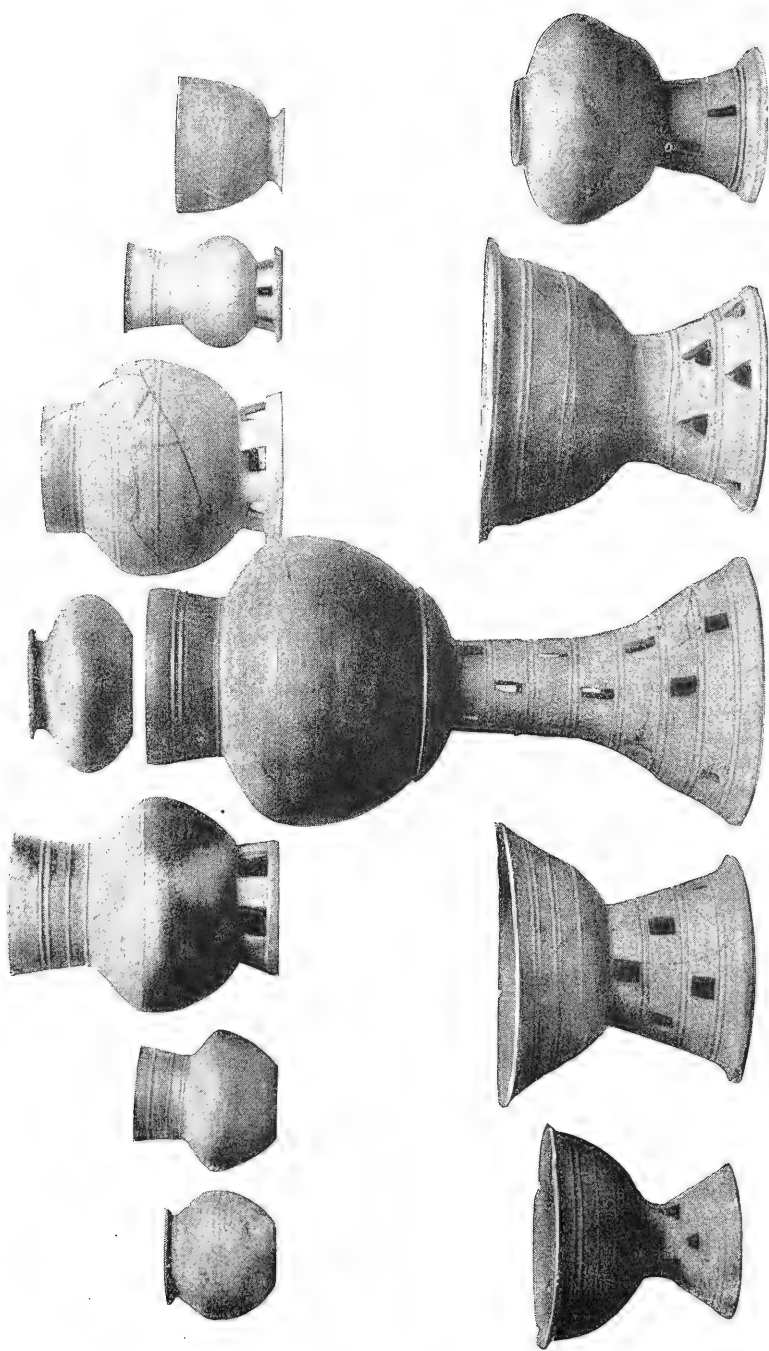
Fig. 4. EARTHEN POT. Brown ware; unglazed. The lower half of the body of this vessel is similar in ornamentation to No. 3 in Pl. LXXXII. The shoulder is ornamented with double-grooved lines. Height, $4\frac{3}{4}$ inches; diameter, $7\frac{3}{4}$ inches. (Cat. No. 94518-8, U. S. N. M. Southeastern Korea.)

Fig. 5. EARTHEN JAR ON STAND. Slate-colored ware; unglazed. Body ornamented with a band of incised waved lines made with a comb having five teeth. This band is between two beaded moldings. The shoulder is ornamented like the body. The neck has beaded moldings around the lower part. Height, $10\frac{3}{8}$ inches; diameter, $9\frac{3}{8}$ inches. (Cat. No. 94518-29, U. S. N. M. Southeastern Korea.)

Fig. 7. EARTHEN BOWL. Slate-colored ware; washed with a yellow slip and lightly fired; unglazed. Height, $4\frac{3}{8}$ inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-30, U. S. N. M. Southeastern Korea.)

(Lower line, commencing at the left.)

Fig. 4. EARTHEN BOWL ON STAND. Brown ware; washed with a brown slip. The sides and lips are ornamented with beaded moldings, between which are bands of waved incised lines made with a comb. The stand is ornamented like the bowl, and also has two rows of six triangular openings. Height, $10\frac{1}{2}$ inches; diameter, $12\frac{1}{4}$ inches. (Cat. No. 94518-23, U. S. N. M. Southeastern Korea.)



KOREAN MORTUARY POTTERY.

EXPLANATION OF PLATE LXXXIV.

KOREAN MORTUARY POTTERY.

(Upper line, commencing at the left.)

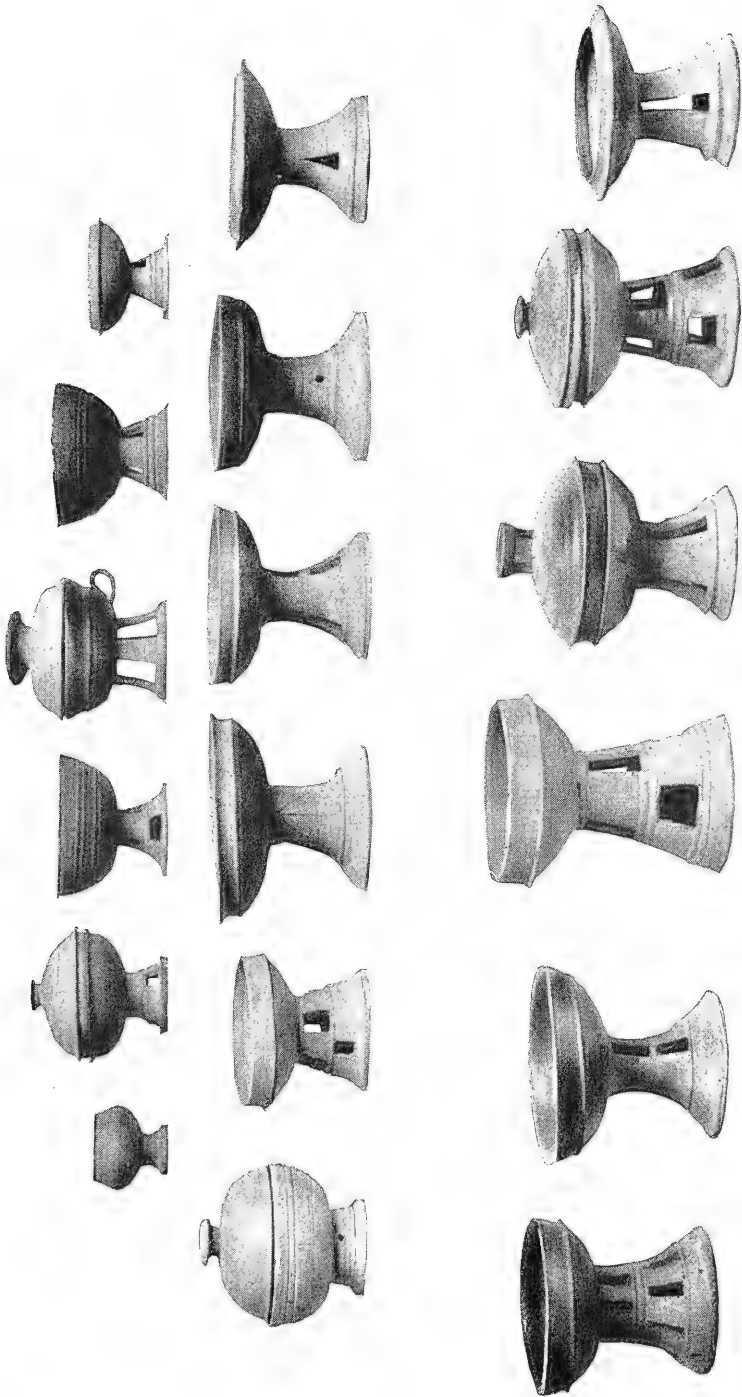
- Fig. 1. EARTHEN CUP ON STAND. Slate-colored ware; unglazed and well fired. Height, $2\frac{5}{8}$ inches; diameter, $2\frac{3}{4}$ inches. (Cat. No. 94518-32, U. S. N. M. Southeastern Korea.)
- Fig. 2. EARTHEN TAZZA, WITH COVER. Slate-colored ware; unglazed. Height, $4\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches. (Cat. No. 94518-48, U. S. N. M. Southeastern Korea.)
- Fig. 3. EARTHEN BOWL ON STAND, WITH COVER. Slate-colored ware; unglazed. Height, $5\frac{3}{4}$ inches; diameter, $4\frac{3}{4}$ inches. Cat. No. 94518-40, U. S. N. M. Southeastern Korea.
- Fig. 6. EARTHEN TAZZA, WITHOUT HANDLES. Slate-colored ware. Height, $2\frac{3}{4}$ inches; diameter, 4 inches. (Cat. No. 94518-43, U. S. N. M. Southeastern Korea.)

(Middle line, commencing at the left.)

- Fig. 1. EARTHEN BOWL ON STAND, WITH COVER. Gray ware; lightly fired. The bowl is decorated with beaded moldings and a band of incised circles. The cover is also ornamented with a band of incised circles, and a band of barred triangles between two circles. Height, $5\frac{1}{4}$ inches; diameter, $5\frac{1}{4}$ inches. (Cat. No. 94518-47, U. S. N. M. Southeastern Korea.)
- Fig. 2. EARTHEN TAZZA. Slate-colored ware. Height, $4\frac{1}{4}$ inches; diameter, $4\frac{3}{4}$ inches. (Cat. No. 94518-46, U. S. N. M. Southeastern Korea.)
- Fig. 3. EARTHEN TAZZA. Slate-colored ware. An incised triangle with a perpendicular line intersecting its apex is cut on the stand just below the bowl. Height, 5 inches; diameter, $6\frac{1}{2}$ inches. (Cat. No. 94518-38, U. S. N. M. Southeastern Korea.)
- Fig. 4. EARTHEN TAZZA. Slate-colored ware; unglazed. In form similar to Fig. 3, except that the stand is pierced with two rows of four rectangular openings. Height, 5 inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-39, U. S. N. M. Southeastern Korea.)
- Fig. 6. EARTHEN TAZZA. Slate-colored ware. Similar to Fig. 3 in form, except that the edge is shouldered to receive a cover and the stand is pierced with but one row of three long triangular openings. Height, $4\frac{1}{4}$ inches; diameter, 6 inches. (Cat. No. 94518-41, U. S. N. M. Southeastern Korea.)

(Lower line, commencing at the left.)

- Fig. 1. EARTHEN TAZZA. Slate-colored ware; glazed a dark brown. Height, $5\frac{3}{8}$ inches; diameter, $5\frac{3}{8}$ inches. (Cat. No. 94518-51, U. S. N. M. Southeastern Korea.)
- Fig. 3. EARTHEN TAZZA. Slate-colored ware; unglazed. Height, 7 inches; diameter, 6 inches. (Cat. No. 94518-44, U. S. N. M. Southeastern Korea.)
- Fig. 4. EARTHEN TAZZA, WITH COVER. Slate-colored ware; glazed brown. The cover is ornamented with incised circles grouped by threes, and with diagonal dotted lines between the first and second, and second and third groups. Height, 7 inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-49, U. S. N. M. Southeastern Korea.)
- Fig. 5. EARTHEN TAZZA. Slate-colored ware, with a bronze glaze. Height, $5\frac{1}{4}$ inches; diameter, $5\frac{3}{8}$ inches. (Cat. No. 94518-45, U. S. N. M. Southeastern Korea.)
- Fig. 6. EARTHEN TAZZA. Slate-colored ware; unglazed. Height, $4\frac{1}{4}$ inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-50, U. S. N. M. Southeastern Korea.)



KOREAN MORTUARY POTTERY.

EXPLANATION OF PLATE LXXXV.

KOREAN MORTUARY POTTERY.

(Upper line, commencing at the left.)

- Fig. 2. EARTHEN COVER OR LOWER HALF OF A BOX. Dark red ware; washed with a dark brown slip. Height, $1\frac{1}{8}$ inches; diameter, $4\frac{1}{4}$ inches. (Cat. No. 94518-35, U. S. N. M. Southeastern Korea.)

(Middle line, commencing at the left.)

- Fig. 1. EARTHEN BOTTLE. Slate-colored ware; unglazed. Neck encircled with a beaded molding. The throat is one-half inch in diameter. Height, 3 inches; diameter, $2\frac{7}{8}$ inches. (Cat. No. 94518-37, U. S. N. M. Southeastern Korea.)

- Fig. 3. EARTHEN CUP OR TUMBLER. Gray ware; glazed dark brown inside and out. Ornamented with three beaded moldings. Height, $1\frac{3}{4}$ inches; diameter, $3\frac{5}{8}$ inches. (Cat. No. 94518-31, U. S. N. M. Southeastern Korea.)

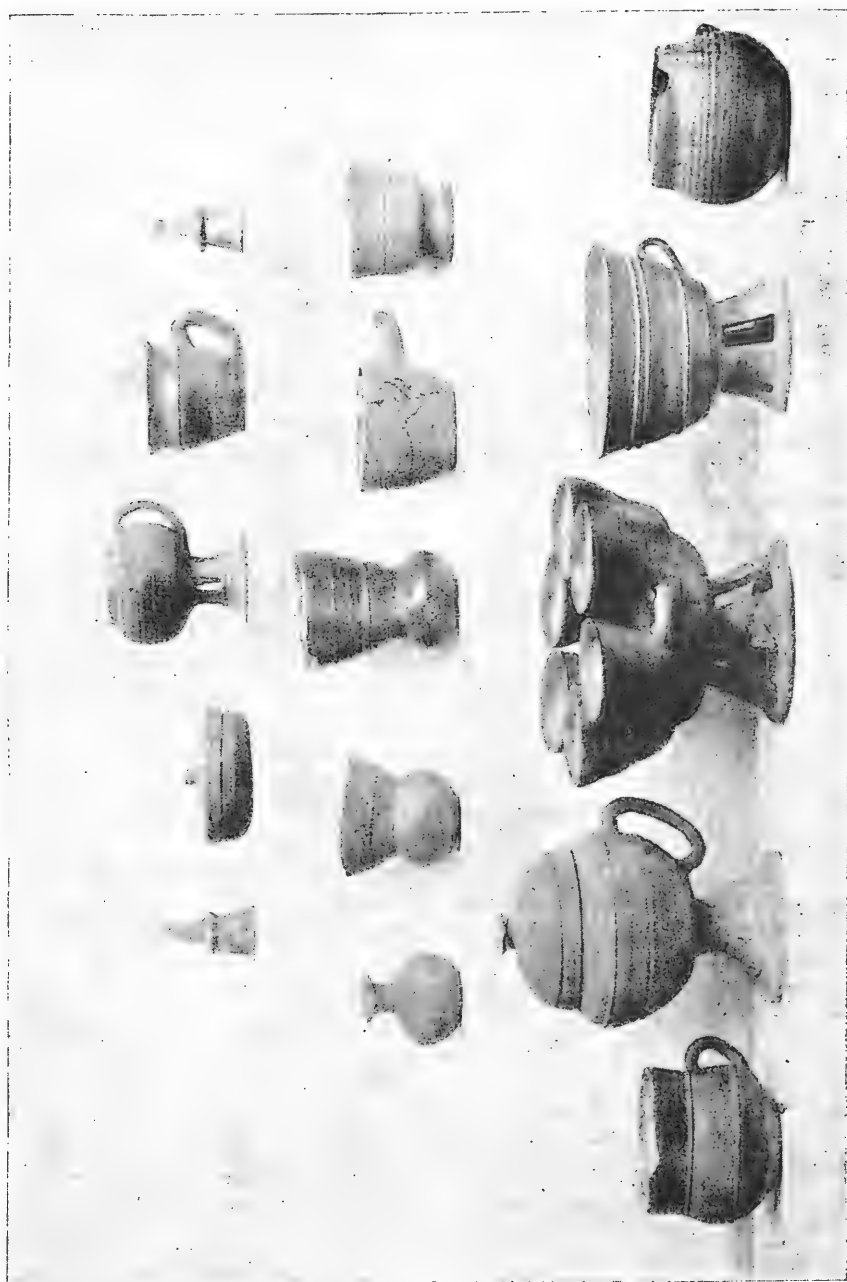
- Fig. 4. EARTHEN CUP, WITH HANDLE. Terra cotta ware; unglazed. Height, $2\frac{7}{8}$ inches; diameter, 4 inches. (Cat. No. 94518-60, U. S. N. M. Southeastern Korea.)

(Lower line, commencing at the left.)

- Fig. 3. EARTHEN FLOWER STAND. Brown ware; unglazed. Height, $6\frac{1}{4}$ inches; diameter, $8\frac{5}{8}$ inches. (Cat. No. 94518-59, U. S. N. M. Southeastern Korea.)

- Fig. 4. EARTHEN BOWL OR CUP ON STAND, HANDLED. Brown ware; washed outside with dark brown slip. The bowl is ornamented with two bands of prominent beaded moldings, between which is a band of waved incised lines made with a comb having four teeth. The handle is small and flat. The stand is molded; its sides are pierced with six openings. Height, $5\frac{1}{8}$ inches; diameter, $5\frac{3}{4}$ inches. (Cat. No. 94518-23, U. S. N. M. Southeastern Korea.)

- Fig. 5. EARTHEN POT, WITH HANDLE. Brown ware; washed with a slate-colored slip. Height, $3\frac{3}{4}$ inches; diameter, $4\frac{1}{2}$ inches. (Cat. No. 94518-27, U. S. N. M. Southeastern Korea.)



KOREAN MORTUARY POTTERY.

EXPLANATION OF PLATE LXXXVI.

MORTUARY POTTERY.

(Upper line, commencing at the left.)

- Fig. 1. EARTHEN VASE ON A STAND. Gray earthen ware; unglazed. The body of the vessel is ornamented with light grooved parallel lines made with a comb. The shoulder is covered with a scale pattern of light incised lines made with a comb. Height, $6\frac{3}{4}$ inches; diameter, $3\frac{7}{8}$ inches. (Cat. No. 94520-1, U. S. N. M. Nara, Japan.)
- Fig. 2. EARTHEN OIL BOTTLE. Terra cotta ware; glazed dark brown. It is ornamented with two grooved lines where the neck springs from the body, and a beaded molding around the middle of the neck. The glaze is wiped off in wide curved lines and dashes from the shoulder. Height, 15 inches; diameter, $7\frac{1}{8}$ inches. (Cat. No. 94519, U. S. N. M. Torai, Korea.)
- Fig. 3. EARTHEN BOTTLE. Terra cotta ware; unglazed. The lower part of the body appears to have been pared with a knife. Height, $3\frac{3}{4}$ inches; diameter, $3\frac{1}{2}$ inches. (Cat. No. 94520-2, U. S. N. M. Nara, Japan.)



VESSELS SHOWN FOR COMPARISON WITH KOREAN MORTUARY POTTERY.

A STUDY OF PREHISTORIC ANTHROPOLOGY.*

HAND-BOOK FOR BEGINNERS.

By THOMAS WILSON.

Prehistoric anthropology is susceptible of many divisions, each of which is sufficiently extensive to form an independent branch of science, such as the following:

Biology and comparative anatomy.

Human anatomy.

Anthropometry, craniometry.

Comparative psychology.

Literature, language (written, oral, sign).

Industry.

Materials and implements of every craft.

Clothing and personal adornment.

Habitations, and household utensils.

Weapons.

Objects for amusement.

Articles, uses unknown.

Architecture. Fine arts.

Monuments and public works.

Roads, trails, canals, irrigating, etc.

Mounds—sepulchral, effigy, altar.

Forts and earth-works.

Graves and cemeteries.

Idols and temples.

Architecture. Fine arts—Continued.

Cliff or cave dwellings.

Towers, ruined or otherwise.

Engraving.

Painting.

Sculpture.

Ceramics.

Decoration.

Ornamentation.

Sociology.

Love and marriage, child-life.

Social organizations, customs and beliefs, pastimes.

Tribal organization.

Government, property, law, etc.

Religion, myths, creeds and cults. Folklore.

Education, relief and charities.

Mortuary customs and furniture.

Short experience in the field will demonstrate the necessity of a knowledge of science, or of certain branches, of even wider scope than those enumerated. Remains of human industry may be found which, insignificant in themselves, derive their value from their geologic horizon. Of this kind may be mentioned the Trenton implements found by Dr. Abbott in the gravel deposits of the Delaware River; the same of the quartz implements found by Miss Babbitt in the terraces of the Mississippi River, at Little Falls, Minn.; the discovery of the remains of a prehistoric fire-place, decided by Professor Gilbert to belong to the

* The imperfections of this fragmentary paper are known to no one better than to the author. It contains nothing new or original, not even the illustrations. No general work on this subject applicable to the United States is easily attainable. Many requests have been received by the author for elementary information. It was found impossible to give satisfactory answers by letter, and this paper has therefore been written as an answer to serve temporary purposes until a more complete work shall have been prepared.—T. W.

quaternary deposits between Lakes Erie and Ontario; and of an obsidian spearhead in the white marl of the Walker River Cañon formed by the fossil Lake Lahontan in northwest Nevada, discovered by Professor McGee; and the paleolithic implements found by Dr. Hilborn T. Cresson, at Claymont, Delaware, and at Upland, Pa.

So also animal remains are frequently found associated with human remains, and therefore some knowledge of zoology is required. The stone implements themselves belonging to the prehistoric peoples require a knowledge of geology and mineralogy to determine their names and the locality from which they come, both of which items may be of great importance.

THE DISCOVERY OF PREHISTORIC MAN.

Denmark is entitled to the credit of the discovery of the existence of man on earth in the ages before history began. The historic period proper of Scandinavia began about 1000 A. D. But for centuries before that time there had been made, frequently on stone monuments, but also in other ways, runic inscriptions and the poetic legends of the early times of that country, called Sagas. The antiquarians of that country in the past century delighted in studying these Sagas. In this pursuit they discovered Kjokenmoddings, the Danish name for kitchen refuse, the dolmens, the polished stone hatchets, the beautiful flint poignards, and the daggers, knives, spear, and arrow-heads, for which that country has been so justly celebrated. They became impressed with the idea that these belonged to a more ancient race of people than that which had written the Sagas and had erected the runic stones. They were able, by their examination and study, to separate the implements found into three grand divisions, which they designated, respectively, the ages of stone, of bronze, and, lastly, of iron. These ages were found to have endured in these countries for a long period of time and came to a high perfection. Thomson published his memoir in 1836, announcing these discoveries. The conclusions were that the Kjokenmoddings were places of habitation of prehistoric man, or, at least, places occupied by him, and that the shells which formed the heaps were but the refuse from his kitchen. The pieces of flint and bone were his implements, the dolmens were his tombs, and the polished and beautifully-worked flints were but his tools and weapons. They placed his earliest occupation of these countries at from three to four thousand years B. C. and continued it down through the epochs of the different ages until that period when the written history of their country began.

The age of stone, when applied to the Scandinavian countries, refers only to polished stone, for no traces of man's existence in those countries during the paleolithic period have been found. Public attention became attracted to the subject of prehistoric man by Dr. Ferd. Keller in 1853, when he discovered in Lake Zurich the remains of the Swiss Lake dwellers of prehistoric times. He found the same ages of stone,

bronze, and iron as have been found in Scandinavia. Other men took up the investigation, and finally the opening of the canal between Lakes Bienne, Neuchatel, and Morat not only brought to light the great deposit of the iron age at La Tene, but so lowered the waters in the two former lakes as to expose their shores, and to turn loose upon them an army of seekers after the implements of prehistoric man.

In 1859 was developed and acknowledged as genuine the discovery of the paleolithic period, an earlier epoch in the existence of prehistoric man. This was called at first the age of chipped stone, because the implements were chipped or flaked, and not polished. This discovery was made by M. Boucher de Perthes in the valley of the river Somme, France. Thus there were found two kinds of stone implements—the chipped and the polished—and from their respective positions it was concluded that they belonged to two different races of men occupying the country at different and perhaps remote periods of time, in which the earlier chipped the stone to make his implements, while the other had so increased his knowledge as to be able to polish them. These different periods were named by Sir John Lubbock paleolithic, meaning ancient stone; and neolithic, recent stone. From that moment prehistoric anthropology received an impetus proportionate to its importance, and since then has gradually elevated its rank among the sciences.

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Prehistoric anthropology is a new science, and although its bibliography is not extensive, it has attracted much public attention and many books have been written in later years. These have either been of a popular character or else have related to a particular epoch or a single locality. No complete or standard work has yet been published, either in Europe or America. Professor Worsaae, of Copenhagen, contemplated such a work, of which Hon. Rasmus Anderson, United States minister to Denmark, was to have been the English translator. But Professor Worsaae's death prevented the carrying out of this undertaking.

Monsieur de Mortillet published "*Le Préhistorique*," which, with its album of illustrations, has become a standard work for the age of stone in France. He now has in press a work to be called "*The Protohistoric or the Aurora of History*."

MM. de Quatrefages and Hamy have now under way a work to be entitled "*Histoire Générale des Races Humaines*," to be published by the ethnologic library, but of which there has, as yet, been issued only the introduction by M. de Quatrefages; and "*The Aztecs*," by M. Lucien Biart.

Dr. D. G. Brinton, professor of ethnology and archæology in the Academy of Natural Sciences of Philadelphia, has edited the portions of the "*Iconographic Encyclopedia*" which relate to anthropology, ethnology, and ethnography. The articles on the two former subjects were prepared by Dr. Brinton, and the latter was translated from the German of Georg K. C. Gerland.

"The Prehistoric Times," by Sir John Lubbock, is the most complete work yet published in English.

It would be useless to attempt the mention of every book extant, dealing with the subject of Prehistoric Anthropology. I give only the most prominent works which should be found in almost every public library. From these a choice can be obtained, and with these the student may obtain a fair start in the science.

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The prehistoric ages have been divided in other parts of the world into stone, bronze, and iron, so called from the material principally employed for cutting implements.

THE STONE AGE.

The stone age has been divided, in Europe, into periods, although scientists are not entirely harmonious therein. The names given, are: Eolithic, or dawn of the stone age; the Paleolithic, or ancient stone; and the Neolithic, or recent stone. The first two are of chipped stone, the last is of polished stone. The first or Eolithic period belongs entirely to the tertiary geologic epoch, and is not accepted by many of the scientists of Europe. I give it a place here because of the possibility of information we may obtain concerning it in America from disputants and investigators. By being thus forewarned they might find implements or evidence in this country which would materially assist in solving the riddle and establish the existence of this period.

THE EOLITHIC PERIOD.

But little is known concerning this age in any part of the world. But enough has been discovered to justify attention to and a search for its evidences in places where they are likely to occur. The implements will be of the rudest possible form, so much so that their human manufacture has been the subject of much discussion, doubt, and, many times, denial. The materials of which the implements found have been made are usually flint or chert, but there is no reason why the man of that period, if he had an existence, may not have used any stone which was capable of being chipped.

It is possible that bone or shell may have been used for implements, and fossil specimens may be found bearing evidence of human workmanship. While no such instance has been recognized, yet the objects are worthy of attention. Fossilized human remains might also be found. Some examples are declared to have been discovered in Europe and in South America, not to mention the contention over the Calaveras skull.

The man of this age is claimed to have had an existence during the tertiary geologic period. On this question the world needs enlightenment. This can only be obtained by intelligent observation, accompanied by accuracy of statement, with minute details, as everything depends, in case of the discovery of a piece of evidence, upon the location, situation, and association of the object, which once disturbed from its original position can not be replaced. It is always best to call whatever of scientific aid is obtainable before any removal is made; also as many witnesses as practicable.

The value of human implements or remains will be greatly enhanced if they are found associated with the remains of fossils, especially animals belonging to that period. These should be gathered and reported with all possible detail and the specimens preserved, no matter in what number. In all discoveries of this kind the contention has heretofore been whether the stratum in which the object is found belongs really to the tertiary or to some later geologic formation, and after that whether there has been any subsequent disturbance or intrusion.

By all means do not seek to clean the specimens by scraping or washing, nor even by brushing. The archæologic value of the Calaveras skull was destroyed by this means.

These objects may be sought for in the clays and gravels of the Washington Columbia formation, in the phosphate beds of South Carolina, the coral beds in the lagoons of Florida, and the *equus* beds of Texas and Mexico. It is the contention of some geologists, though disputed by others, that the auriferous gravels of California also belong to the tertiary formation.

THE PALEOLITHIC PERIOD.

The paleolithic period of the stone age has been subdivided into various epochs, though in these subdivisions and their nomenclature the scientists of Europe are by no means agreed. M. Lartet named the epochs after the animals which have been found associated with the implements and called them, respectively, the epochs of the cave bear, the mammoth, and the reindeer. Monsieur Dupont, of Belgium, divided it only into two and named the epochs after the mammoth and the reindeer. M. de Mortillet has divided it into four epochs and has named them, respectively, the Chellian, after the station of Chelles, a few miles east of Paris; the Moustierian, after the cavern of Moustier on the river Vézère, Dordogne; the Solutian, after the cavern of Solutré near Macon; and the Madelenian, after the cavern or rock shelter of La Madeleine, Dordogne.

In later days the tendency seems to be to divide them otherwise. M. Cartailhac, M. Reinach, following Mr. John Evans, are in favor of the first period being called that of the alluvium and the second that of the caverns. All these gentlemen are, however, unanimous in their agreement that this period and all these epochs, whatever they are to be called, belong to the quaternary geologic period; that they were earlier than the present geologic period, and that they came to an end before its commencement. The most certain, and therefore to me the most satisfactory division, has been that of M. de Mortillet, named after the various localities where the respective implements have been found in their greatest purity. I give my preference to it, but do so subject to the correction incident to further discovery. If for no other reason it is more convenient. The names given are for localities and, consequently, are purely arbitrary. They may not, perhaps, serve for general terms over the world, but within their own locality they have a definite and certain meaning, while to say the epoch of alluvium, the epoch of caverns, the epoch of the drift, or the epoch of the mammoth, bear, reindeer, etc., might have an application in other countries which would deceive the student or reader. The names of Chellian, Moustierian, etc., have no such application, are not possible to be applied to other countries. They mean, then, just one kind of civilization, one kind of implement, and thus we know what is meant when

these terms are used. If other countries have different things to be described, if different epochs are found, then other names may have to be given, but when we speak now of these epochs, the Chellian, Moustierian, etc., and the implements that belong to them, the speaker and hearer are on a common ground in which both understand the same terms used to mean the same thing.

The world is indebted principally to M. Boucher de Perthes for the great discovery of prehistoric man in the paleolithic period. He lived at Abbeville, on the river Somme, about half way between Paris and Calais. In 1841 he found in a sand-bank, then being worked at Menche-court, a piece of flint rudely fashioned to an edge and point, which excited his attention and wonder, for he asked himself, "How could this stone have taken this form by any other than human intervention?" He continued his investigations at occasional intervals, chiefly in the excavations and fillings at Abbeville and in the gravel which was being removed he found many of the same implements. In the year 1846 was published his first work on the subject, in which he announced his belief that these were human implements and of the same age as the gravels in which they were found. This statement made but few converts; nevertheless, being an enthusiast, and pressing his belief always in season and sometimes, possibly, out of season, came to be regarded as what would now be called a "crank."

Doctor Rigollot, in 1853, was the first to make such examinations of the locality by which, finding the implements *in situ*, he became a believer in the new theory. M. Boucher de Perthes was no exception to the rule that prophets are without honor in their own country. At last, however, the tide turned in his favor, and I can not do better than to quote from Sir John Lubbock, himself one of the actors, his description of the event:

In 1859 Dr. Falconer, passing through Abbeville, examined the collection of M. de Perthes, and on his return to England called the attention of Mr. Prestwich, Mr. Evans, and other English geologists to the importance of his discoveries. In consequence the valley of the Somme was visited in 1859 and 1860, firstly by Messrs. Prestwich and Evans, and shortly afterwards by Sir C. Lyell, Sir R. Murchison, Messrs. Busk, Flower, Mylne, Goodwin-Austen, and Galton; Professors Henslow, Ramsay, Rogers; Messrs. H. Christy, Rupert Jones, James Wyatt, myself, and other geologists.

Mr. John Evans, in his "Ancient Stone Implements of Great Britain," describes the same event:

We examined the local collections of flint implements and the bed in which they were said to have been found, and, in addition to being perfectly satisfied with the evidence adduced as to the nature of the discoveries, we had the crowning satisfaction of seeing one of the worked flints still *in situ* in its undisturbed matrix of gravel, at a depth of 17 feet from the original surface.

The locality was also visited by the French savants who were especially qualified for such a scientific investigation. MM. Mortillet, d'Acy, Gaudry, de Quatrefages, Lartet, Collomb, Hebert, de Verneuil, and G.

Pouchet. Dr. Gosse, of Geneva, was also an earnest and ardent investigator. Mr. John Evans says :

Indeed it turned out, on examination, that more than one such discovery had already been recorded, and that flint implements of similar types to those of Abbeville and Amiens had been found in the gravels of London at the close of the seventeenth century, and in the brick earth of Hoxne, in Suffolk, at the close of the eighteenth, and were still preserved in the British Museum and in that of the Society of Antiquaries.

The name "paleolithic" was given to this period by Sir John Lubbock. It is composed of two Greek words signifying ancient stone. Belonging to the stone age, all its cutting implements were, of course, of stone. The method of manufacture was by chipping, and all cutting edges or points were thus made. The man of this period seems not to have known, at least never employed, the method of smoothing or sharpening a stone by rubbing it against or upon another. Bone and horn implements were also made during this period, and in its latter part were apparently greater in numbers than the stone.

This period belongs entirely to the quaternary (pleistocene) geologic period, and is assumed to have been contemporaneous, in Europe at least, with the formation of the river valleys and the deposit of the gravels therein. The climate of the first epoch is supposed to have been warm and moist; that it afterwards grew cold, and man in Western Europe sought the caves for protection. It is believed by many this period of cold corresponds with the glacial epoch of that country.

The fauna of the first epoch was composed principally of animals which were extinct before our earliest knowledge of natural history. The *Elephas antiquus*, a pachyderm, the ancestor of the elephant tribe; *Rhinoceros Merckii*, *Trogontherium*, a large beaver, have been found at Chelles, associated with implements of human industry.

These animals are now all fossil. They belong to the quaternary geologic period, and have never been seen or known in the present day. They have been found in many other prehistoric stations associated with the Chellian implements of human manufacture. Here was the beginning of human art. This was the first art product.

The foregoing sentence might be easily overlooked. Its importance is largely out of proportion with the space which it occupies, for it tells the story that man existed in that country contemporaneous with these animals, and in a geologic period so much older than the present that one can scarcely imagine man's antiquity as having any relation thereto. The succeeding epochs were more like that of the present. The mammoth came first, and after it the reindeer. One can obtain a faint idea of the time by considering that the reindeer which occupied Southern France in probably greater numbers than it now does in Lapland, was the animal on which the prehistoric man of this epoch in that country relied principally for his food. A study of the fauna of that period in southern France, as compared with that of the present, shows that there were eighteen species of animals, then

occupying that country, which in the present time have immigrated to the colder regions. Thirteen of them have gone to the north, by degrees of latitude, while five, like the chamois, mountain goat, etc., have retreated to the mountains in search of that cold which was necessary to support their lives, and which they did not find in the subsequent warm climate of southern France.

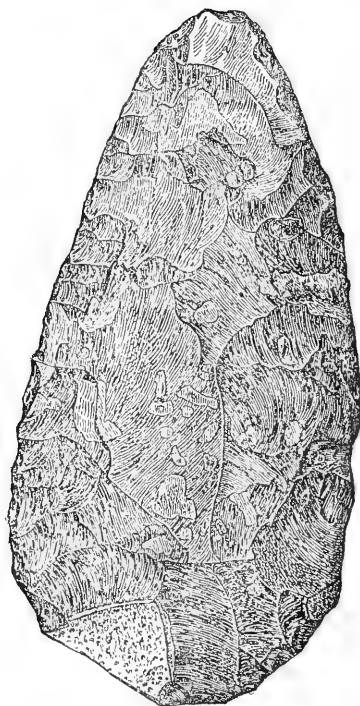
THE CHELLIAN EPOCH.

The Chellian implements here figured are the standard ones for this period, though they were mostly almond-shaped or oval, with the cutting edge to the point, which is the contrary to those of the neolithic period. The body of the implement was thick, after the shape of an almond or peach stone. It was not thin and flat like those of the later epoch, the Solutrian, and the two are not to be confounded. They are made of flint where that stone was obtainable; where it was not, quartz and quartzite seems to have been employed, although any stone would serve which was homogeneous, so that it might be flaked in every direction; tough, that it might hold an edge, and hard, that it would not break or crumble. The flint always broke under a blow with a conchoidal fracture, and this may be frequently seen.

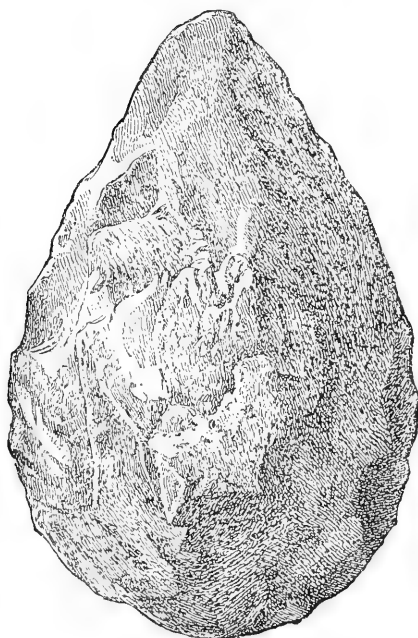
These implements differ somewhat in form and size, though they are substantially the same. Some of them are more round; others more pointed. A few approach the disk form, and have an edge which might have served for scraping rather than cutting; but all we know of this is obtained from an examination of the object itself. They were all made by chipping, and were usually brought to an edge by the removal of smaller and finer flakes. Chips, flakes, spawls, etc., the debris of manufacture, are frequently found in the deposits associated with finished implements. Many, indeed most of the specimens, show signs of use. Some are broken and others apparently unfinished.

Occasionally the cutting edge extends nearly around the implement, but many times a portion of the pebble is left for a grip. So, while it is possible it may have been attached to a handle in some cases, it is evident that sometimes it was intended to be taken in the hand. The hand may have been protected against the sharp ones by a bit of skin, fur, grass, or other substance. I much doubt whether any of them were attached to a handle, for it must have been with great care and labor that the workman was able to bring them to this sharp edge all around, and when so done it produced a form of implement very difficult to successfully insert in a handle. To make a firm attachment the handle must envelop it at its greatest diameter, and herein lies the difficulty. If the sharpened implement be only partially inserted, a few hard blows would split the handle; if it be inserted too far the same blow will drive it through. Plate LXXXVII, Figs. 1-2.

The flint of which these implements are made has, in many specimens, passed, since their manufacture, through certain chemical and



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PALEOLITHIC IMPLEMENTS.

FIG. 1. Chellian implement (flint); from St. Acheul. France.
FIG. 2. Chellian implement (quartzite); from India.

physical changes on their surface. Some show a brilliancy called patine; in some the color has changed to red and yellow, and so on through the scale to chalky white. This change is produced by contact with the atmosphere or earth, or by the contact of water which has percolated through the various earths in the neighborhood, generally those containing iron, and has changed the chemical combination of the flint on its surface. This change sometimes extends deep into the stone, and in small specimens may pass entirely through it. In the United States all this might be called weathering; in France it is called patine. The objection to the former word is that it conveys, possibly involuntarily, some relation to the weather, while the patine may be formed on a specimen deep in the earth.

Dendrites are also formed on the specimens. These changes are all evidences of antiquity of the specimen, and to the experienced eye become testimonials of its genuineness.

The use of the Chellian implement is unknown. The wise men of Europe have made many guesses and suppositions, but these are at best nothing more than speculation. Many of them bear undoubted traces of use on their edges. Mr. John Evans in his latest work reverts to his first and original opinion, "That it is nearly useless to speculate as to the purposes to which they were applied." Sir John Lubbock says, "Almost as well might we ask to what would they not be applied. Infinite as are our instruments, who would attempt even at present to say what was the use of a knife? But the primitive savage had no such choice of tools. We see before us, perhaps, the whole contents of his workshop, and with these weapons, rude as they seem to us, he may have cut down trees, scooped them out into canoes, grubbed up roots, kill animals and enemies, cut up his food, made holes in winter through the ice, prepared firewood," etc.*

The implements of the Chellian epoch are found substantially all over the world. This would indicate, if it does not prove, the expansion of that civilization, and the duration of that epoch to have been much greater than has ever heretofore been supposed. Those from Great Britain are found only in the eastern and southern portion, from Norfolk around to Devonshire and Land's End. They have been found in every quarter of France and southern Belgium, Italy in all its parts, also in Spain and Portugal. They have not been found in northern England, Scotland, Wales, or northern Ireland. Neither in northern Belgium, or Holland, or in the Scandinavian countries, or that portion of Germany bordering on the Baltic, or in northern Russia. These countries were probably covered at that epoch with glaciers, or possibly by the Great North Sea. Paleolithic implements have been found in Asia, Palestine, in India from Bombay to Calcutta, in Cambodia, Japan, in Africa all along the shores of the Mediterranean, and up the valley of the Nile, and lately in the United States.

* Prehistoric Times, p. 364.

They have been called in England drift implements, because they have been found in the river drifts or deposits. Their position when thus found indicates the same antiquity as the river valleys themselves. There was a time when the rivers filled the valleys from hill to hill, pouring down with a rush and carrying the greatest quantity of water to the sea. In that time the irresistible current eroded the earth, and, if need be, the rock, to make for itself a waterway. As time progressed the water subsided more or less, and the current become slower and less powerful. The sand and gravel which had before been carried out to the sea began to be deposited here and there in this bend and on that point, until the deposit came to the surface of the water and formed what is now the highest terrace. Then the river was narrowed and the terrace became a new river bank. This process was repeated again and again until the river finally retreated to its present bed, and left terraces, sometimes three in number, the first being higher, deeper, and more distant from the river than the others. These are now the marks of the successive stages in the formation of the river valleys.

The sand and gravel deposit of the river at Chelles spreads out and forms the plain of the river valley. It is from 22 to 26 feet in thickness. The sand and gravel rests upon the original chalk, and is about on a level with the highest floods of the river in modern times. These deposits are of different degrees of fineness, and are laid in strata or layers, showing that they were made by the action of water. The strata are not always continuous, and differ in thickness and position, showing that the water had varying currents. There are to be found occasional huge blocks of erratic stone. The sand and gravel is sometimes intercalated by other strata which could not have been laid down at the same time or in corresponding manner. One of these is a stratum of calcareous cement several inches in thickness. In many other places, but nearer the top, are pockets or strata which contain various solutions of iron, the percolating water from which gives the color to the implement heretofore described.

There have been many and great discussions over the formation of these river valleys and the deposits of their sand and gravel. These as to the time, manner of formation, and antiquity. I do not enter into this discussion now. I merely state a fact on which all disputants are agreed: that the implements of human industry belonging to this epoch are found in these river gravels, in positions which indicate their deposit at the time of the original formation and at a distance from the river and depth below the surface which indicates their antiquity to be equal with the first deposit. Whether they were swept down from the springs which formed the headwaters of the river, were dropped on the borders in the near neighborhood, or precisely in what manner they became involved with the sand and gravel in which they are now found, is not only unknown but there has as yet been developed no satisfactory theory.

In seeking to establish the existence of a paleolithic period in America, it has been objected that many of the implements introduced as evidence were found on the surface. In western Europe surface finds are not at all uncommon. The St. Germain Museum, at Paris, exhibits six cases of Chellian implements. In five of them are displayed those from the river gravels, and in one is shown similar implements from the surface. These are distinguished as being from the plateau. (The plateau in this case meaning the surface of high level unaffected by the wash of the water which formed the river.) Mr. Solomon Reinach, curator of that museum, in his catalogue and "*Description Raisonnée*," says, page 84:

The implements found in the ancient alluvium of the rivers are those which have been used or have been rejected. Sometimes they are water-worn, sometimes altogether new and even unfinished. * * * The implements gathered on the plateau come from the camps or workshops. They are much less interesting than those of the alluvium, not being accompanied by a fauna which can serve for their chronologic classification. * * * As the soil of the plateaus is continually upturned by its cultivation, which has thrown together in the same layers the remains of successive civilizations, so the paleolithic and neolithic instruments are often found on or near the surface mixed with those of the epoch of metal and of modern times.

The plateaux on the surface of which these Chellian implements were found extends largely over the interior of France.

Dr. John Evans, the celebrated prehistoric archæologist of England, and the author of "*Ancient Stone Implements of Great Britain*," says in that work (page 531), "Not far from Currie Farm I found *on the surface of the ground*, in 1869, a well-marked paleolithic implement, in character and size resembling that of Stud-Hill (Fig. 462), and stained a rich ochreous color." During a visit to Dr. Evans's collection in 1889 the writer saw thirty or more paleolithic implements which had been found *on the surface* in the neighborhood of Ightham, Kent. Mr. B. Harrison has gathered in the same neighborhood nigh six hundred paleolithic implements which are described by Mr. Prestwich in the *Quarterly Geologic Journal*, No. 178, of May 1, 1889. I quite agree with Mr. Reinach that these surface implements are much less interesting than those found in the river gravels. I agree and have always said that the implements thus found are not proof of the *antiquity* of the paleolithic period. The most I have ever contended was that they were evidence of its *existence*. The paleolithic implements of Europe have been found by the ten thousand in the river gravels at various depths, and associated with the extinct fauna of the Quaternary geologic period. Thus the antiquity of the paleolithic period has been established without the aid of the implements found upon the surface. In the United States this is not the case; therefore the discovery of the paleolithic implements on the surface have a greater relative importance than in Europe. They, however, are evidence only of the existence and not of its antiquity of a paleolithic period. The antiquity remains to be solved by other means.

Enough has been said to demonstrate that the paleolithic implements of this epoch belong to one general type. Their similarity of material, mode of manufacture, and general appearance all testify thereto. While there is this similarity they are not copied one from another. Each one has an individuality, yet they can be recognized as belonging to a common family and having a common origin. In this manner, and for these reasons, a person acquainted with them, or who has had sufficient experience, will be able to recognize a Chellian implement independent of its locality or its associations. This knowledge comes only from experience, but it is the same experience by which the American archaeologist recognizes the genuineness of the arrow or spear head, the polished stone hatchet, Indian pipe, and similar objects, and is fairly able to assign them to their proper localities.

The following paragraphs, relating to the differences in form between paleolithic and neolithic implements, may be found of interest:

A glance at the stone implements hitherto discovered in the river drift, whether of England or France, will at once show how different in character they are, as a whole, from those of the neolithic period, excepting, of course, mere flakes, and implements made from them, and simple blocks and hammer-stones. So far as we at present know, not a single implement from the river drift has been sharpened by grinding or polishing, though, of course, it would be unsafe to affirm that such a process was unknown at the time when they were in use. With the unpolished implements of the neolithic period, which most nearly approach those of the paleolithic in form, it will, as a rule, be found that the former are intended for cutting at the broader end, and the latter at the narrow or more pointed end. Even in the nature of the chipping a practiced observer will, in most instances, discern a difference.

When first treating of the character of these instruments (in the *Archæologia*, now thirteen years ago), I pointed out these differences between the implements of the two periods as being marked and distinct; and though since that time, from our knowledge of the form and character of the stone implements of both periods having been much enlarged, some few exceptions may be made to a too sweeping assertion of the distinctions between the two classes, yet, on the whole, I think they have been fully sustained.

Unground flint implements, with a sharp point and a thick truncated butt, and, in fact, what I have termed tongue-shaped in form, are, for instance, no longer confined to the drift, but have been found by myself, with polished implements, on the shores of Lough Neagh, in Ireland; and yet, though analogous in form, they differ in the character of the workmanship, and in their proportions from those from the gravel. The difference is such that, though possibly a single specimen might pass muster as of paleolithic form, yet a group of three or four would at once strike an experienced eye as presenting other characteristics.

In the same manner some of the roughly chipped specimens from Cissbury and elsewhere—such, for instance, as Fig. 28*—appear to be of the tongue-shaped type, or like other river-drift forms. These are, however, exceptional in character, and as their finding appears to be confined to the sites of manufactories of flint implements, where a very large proportion of the specimens found are merely “wasters” produced in the manufacture, it is doubtful how they are to be regarded as finished tools.

On this subject of the difference in character between the paleolithic and neolithic forms I have been severely taken to task by M. Zinck, in the *Proceedings of the Society of Northern Antiquaries of Copenhagen*, who has figured several Danish neolithic specimens in juxtaposition with some of my own figures of implements from the drift. In many cases, however, the comparison is made between implements of very

* Ancient Stone Implements, p. 74.

different dimensions, though, by being drawn to different scales, they are made to appear of the same size in the figures; and, in other cases, the specimens engraved are apparently unfinished, or merely wasters thrown away.

But, even granting that these exceptional instances of resemblance can be found, there is no one who can deny that the general *facies* of a collection of implements from the river drift, and one from the surface, is totally and entirely distinct. With regard to the Danish stone antiquities, I think I may safely say that I have as extensive a collection of them as any one out of that country; and, further, that I have more than once examined the collections, both public and private, at Copenhagen, as well as at Stockholm and Lund, and yet that I do not remember to have seen any specimen—unless possibly a mere flake or rough block—which, if placed before me without comment, I should have taken to be paleolithic.

In most cases, even if a similarity of form should be found to exist, there will be a difference in the character of the surface of the material; the deep staining more especially, and the glossy surface so common on the implements from the gravel, being but rarely met with on those from the surface soil.

But, though, on the whole, so widely differing from the implements of the neolithic period, those belonging to paleolithic times show a marvelous correspondence with each other in whatever part of England they are found; and this correspondence extends, in an equal degree, to the implements found in the river gravels of France. In illustration of this, Mr. Flower has engraved, side by side, two implements from Thetford and two from St. Acheul, each pair being almost identical both in shape and size. But what is more remarkable still, this resemblance in form prevails not only with the implements from the river gravels of western Europe, but with those from the laterite beds of southern India. It is true that the material is somewhat different, the Indian implements being formed of compact quartzite instead of flint, and that this circumstance somewhat affects the character of the fracture and facets, but, so far as general form is concerned, they may be said to be identical with those from the European river-drifts.*

MOUSTIERIAN EPOCH.

This is the commencement of the cavern period. During this epoch and the two succeeding, man inhabited principally the caverns and rock shelters. While I would not assert that the implements and objects belonging to these epochs are not to be found on the surface and otherwheres, yet it is true that the habitations, the workshops, the residences, the fireplaces, hearths, etc., of these three epochs, are to be found principally in the caverns or under the rock shelter. When Monsieur Reinach speaks of the epoch of alluvium, he means the epoch prior to this; when he speaks of the period of the caverns, he means these three epochs following. It is entirely possible that these may have been contemporaneous, that man may have occupied them all at once, to have made and used the implements belonging to these epochs all at one time, and such has been the contention of some eminent scientists. But they are not by any means agreed upon that theory or statement. These subdivisions of the cavern period, made by M. de Mortillet, are Moustierian, the Solutrian, and the Madelenian.

The Moustierian is so named after the Cavern de Moustier, on the river Vézère, Dordogne, France. The typical implements are the

* Evans: *Ancient Stone Implements of Great Britain*, p. 568.

point and scraper.* The point is different from all other points, in that while one side is left flat and smooth as it was struck from its nucleus, the retouching by which the point and edge are made is all done from the opposite side. The scraper is made in the same way, and its peculiarity is that its edge is upon the side rather than upon the end, as it was in all succeeding epochs. These appear to have been the first scrapers used by the pre-historic man. While the Moustierian implements have been found in the river gravels of Europe, there has been much contention as to their contemporaneity with those of the preceding epoch. But they have been found in the caverns at such depths and with such associations as to cause many pre-historic anthropologists in Europe to believe that they formed a separate epoch, during which the caverns were occupied by the inhabitants for a long period of time. It has been contended that this epoch was, at least in southern France, contemporary with the glacial period. This, if established, would sufficiently account for his occupation of caves and rock shelters. The extinct fauna of the preceding epoch is not found in connection with these implements. The animals become more like those of our own time. This epoch begins what has been called the cavern period.

SOLUTRIAN EPOCH.

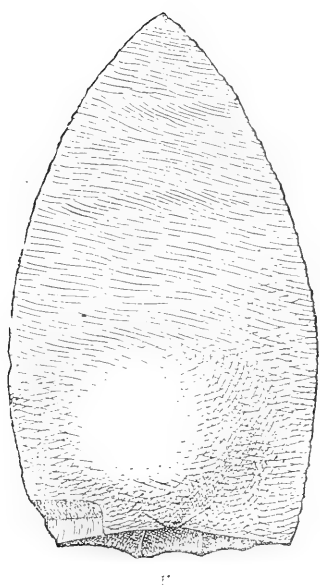
Is so named after the Cavern of Solutré, near Macon, Sâone et Loire. The Chellian implement had in this epoch ceased to be made; also the one-sided Moustierian point. They were probably replaced by the large and thin spear-head which is shaped like a laurel leaf. The scrapers have been changed in form. They are smaller, and the scraping edge is on the end instead of being upon the side. Knives and saws of flint also appear. The man of this epoch excelled in the art of chipping flint. Indeed, it is doubtful if any subsequent age or epoch even equalled him. The implements are renowned for beauty of form and fineness of finish. It is by this progress that this epoch has become recognized. It is remarkable that these leaf-shaped implements should be found in France in nests or *en cache*, and that great numbers of similar instruments should be found in the United States likewise frequently in nests. It would be exceedingly strange if, upon further study and careful investigation, it should be discovered that the American implements should belong to the same paleolithic epoch, as do those of France.†

Points were also made of bone, sometimes apparently for use in piercing skins, or for sewing garments. Sometimes to replace the chipped flint for spear-points. Another implement peculiar to this epoch was a fine flint-point, apparently a spear, with a tang and shoulder on only one side.

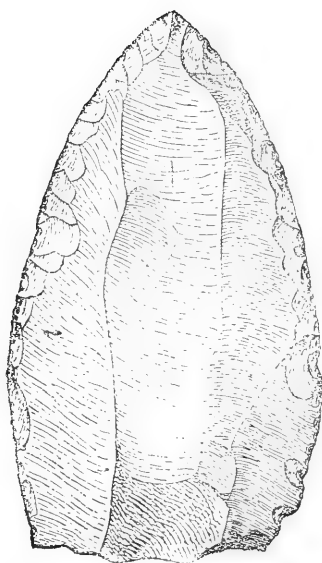
But it is in its art products that this period is remarkable. The Chellian implements and the Moustierian points and scrapers are scarcely fine enough to be worthy of the title of artistic.

* Plate LXXXVIII.

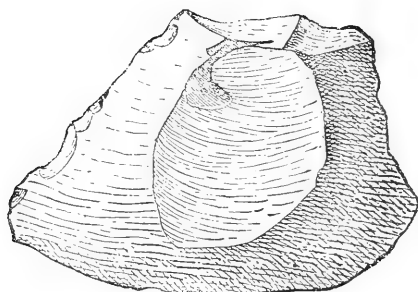
† Plate LXXXIV, Figs. 1, 2, 3, 4.



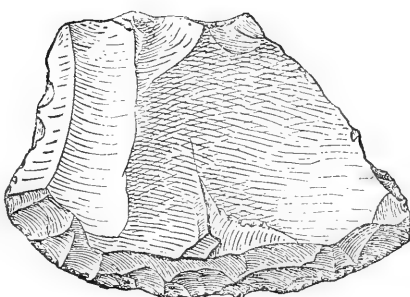
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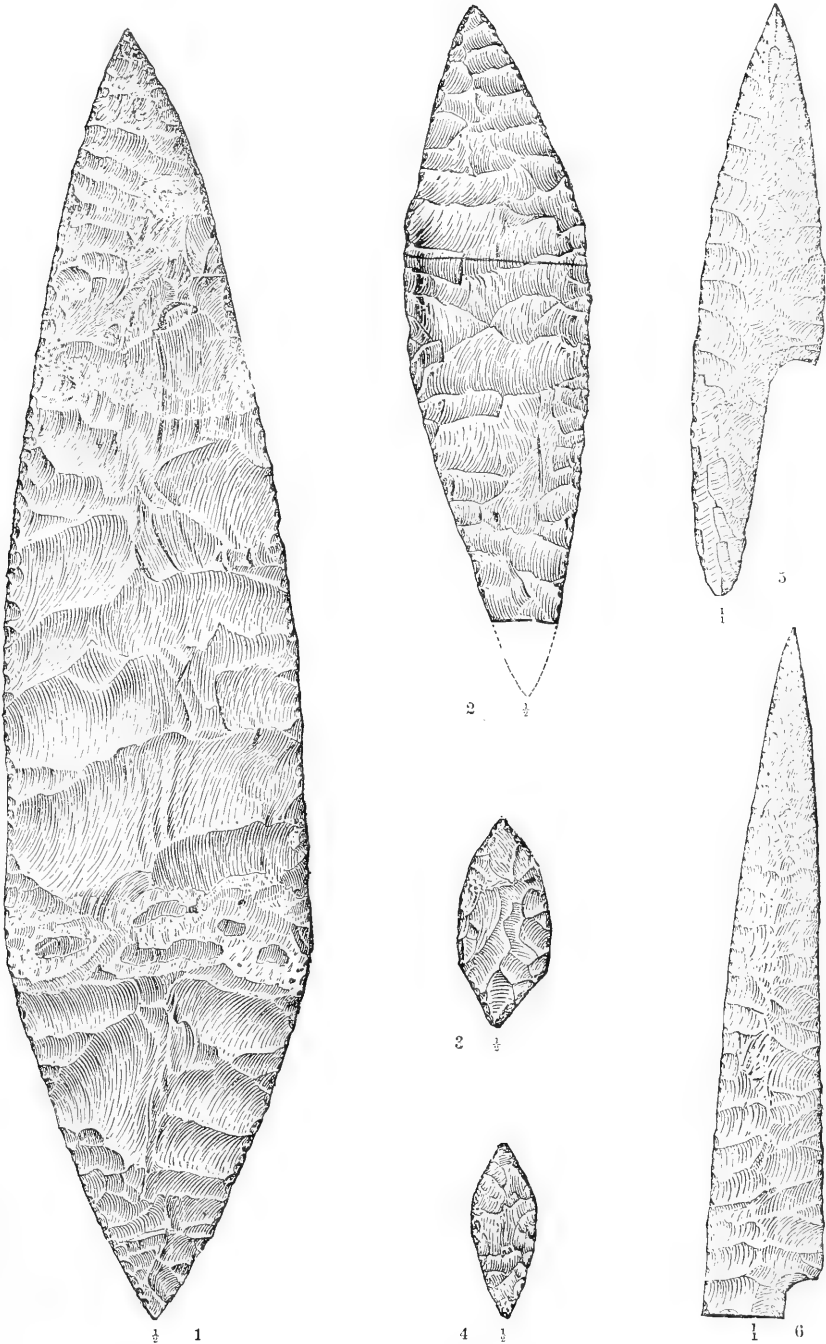
PALEOLITHIC IMPLEMENTS.

FIG. 1. Moustierian point, spear or otherwise (flint); from cavern of Le Moustier.

FIG. 2. Opposite side of Fig. 1.

FIG. 3. Moustierian scraper, showing bulb of percussion (flint); from Chez Pouré.

FIG. 4. Opposite side of Fig. 3.



PALEOLITHIC IMPLEMENTS.

FIG. 1. Solutrian point; shape of laurel leaf. Rigney-sur-Arroux (Saone-et-Loire), France.
FIG. 2. Solutrian point. Grotte de l'Eglise, Dordogne.
FIG. 3. Solutrian point. Grotte de Gargas, Vaucluse.
FIG. 4. Solutrian point. Grotte de l'Eglise, Dordogne.
FIGS. 5 and 6. Solutrian implements, beautifully chipped for spear or other points, with a shoulder on one side. They may have been used for fish spears or harpoons (flint); from Dordogne.

The art of the third period, the Solutrian, was much finer, although confined to the chipping of flint and the making of bone and horn implements. The representative implement of this epoch is the flint spear-head or dagger, which was shaped like the laurel leaf. It was in the working of the flint to make these objects that the best art of the Solutrian epoch is manifested. It may be objected that there was no art required in chipping flint implements, but an inspection of those from the Solutrian epoch, coupled with an attempt on the part of the objector to make one of the larger and finer, will show how far he is from the truth.

An examination and measurement of these implements is required to understand the delicacy of their manufacture. It must have required much education and experience and a large amount of manual dexterity.

Figure 1 represents one of these leaf-shaped points found *en cache* with ten others. It is one of the largest known, and is in the Museum of Chalou-sur-Saone. Its length is 14 inches, its breadth $3\frac{1}{4}$, and its greatest thickness less than three-eighths of an inch. It is made entirely by chipping, which is not either primary or secondary, but appears to be even tertiary. The flakes by which it has been reduced have been struck or pressed off from the edge, and are so long and thin as to resemble shavings rather than chips.

The art of chipping flint attained its highest point during this epoch. It has never been exceeded, and rarely equalled in any time and by any people. The pre-historic people of Scandinavia, in Europe, and those of Mexico and California, in America, are the only ones which have in any way approached it. The modern Indian has chipped his arrow-heads, and many persons of high artistic abilities have, in the interest of science, reproduced them, making them sometimes of flint, obsidian, and even of common bottle-glass. Occasional persons have used their abilities, like "Flint Jack," in making spurious implements to be palmed off as genuine ones. But no flint-knapper of the present day, whether amateur or professional, has yet been able to reproduce one of the fine, Solutrian, leaf-shaped implements. We have had to contend many times with other fraudulent and spurious specimens which evinced a high degree of art and manual dexterity, but never with forgeries or counterfeits of these beautiful implements.

MADELENIAN EPOCH.

So named from the rock shelter, La Madelaine, on the Vézère, Dordogne, about half way between Le Moustier and Les Eyzies.

This epoch endured longer than the preceding. Its stations are more frequent; the area more extended; its implements increase in number, variety, and form, and indicate continued progress. While in former epochs the material used by man for the fabrication of his utensils and implements was almost entirely of flint, or at least stone, in

this epoch he used bone, horn, and ivory. He made the long straight flakes of flint in profusion, for his need for knives and saws was naturally great.* Scrapers, gravers, etc., were also of flint (Figs. 1, 3, 4); but piercers or points, needles, harpoons, hooks, and ornaments of divers sorts, were made of bone, horn, or ivory.†

It was in the Madelenian epoch that pre-historic art attained its perfection. The art of that epoch seems to have been indigenous to that country in which its greatest manifestations have been discovered; that is, the Dordogne district of France. It does not seem to have been an imitation, nor to have been borrowed from any other country or people, but only to have been a display of the artistic tendencies of the human mind, and a manifestation of the manual dexterity of that period and locality. It consisted sometimes of sculpture done in the round, sometimes of engravings or etchings on stone, bone, or horn, possibly on wood (though such specimens have decayed), and also the making of the bone and horn implements such as points, harpoons, daggers, needles, etc. The decoration was sometimes of geometric designs made by curved or straight lines, by festoons, zigzag, or her-ring-bone, or by the same figures made by dots or points.

The principal and wonderful manufacture of art in this epoch was the representation of living things. Sometimes the animals represented are at rest, but many times they are in action. Hunting scenes are depicted in which the hunter, a man, is shown in the chase and engaged in active conflict with his game. In one, a man is throwing a spear; in another, the serpent bites his heel;‡ deer in action; the reindeer with his nose high in the air and horns thrown on his back. A reindeer browsing, which represents a veritable landscape with perspective drawing. The engraving and sculpture represent the mammoth, the reindeer, horse, bison, birds, fish, serpent, musk-ox, and others.§ Some of these are Arctic animals now found only in cold countries. Some of these are of animals now extinct. A mammoth is found engraved on a piece of ivory (part of his own tusk), a cave-bear was engraved on a flat stone of schist, a poignard was made of reindeer horn, the handle of which is in the form of a reindeer himself. These all came from southern France, and are evidence of their existence in that locality, for the artist must have seen them before he could depict them.

The art tools with which this work was done have been found in considerable numbers. They are of flint, and have been chipped to the same sharp, triangular point as the steel graver of modern times.||

The implements and utensils of every-day use were objects of an art by no means contemptible, even as compared with those of our times. The harpoons, needles, daggers, and other implements and utensils were so ornamented as to show an appreciation of decorative art applied to household or domestic uses which would not be unworthy the decorative schools of art of the nineteenth century.

* Plate XCI, Fig. 2.

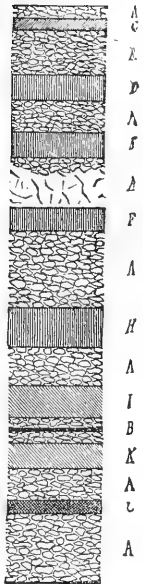
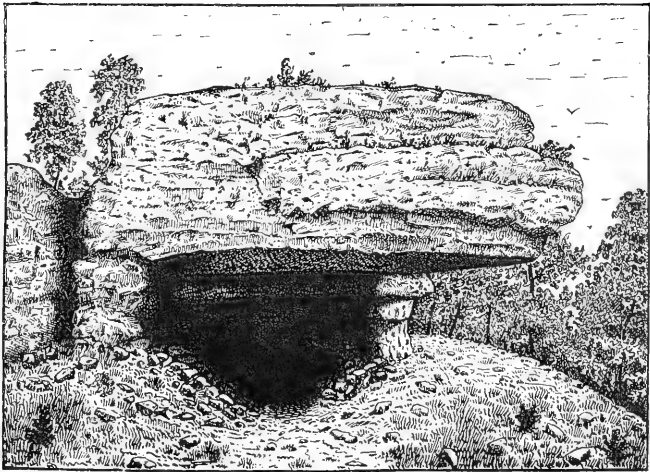
† Plate XCIII, Fig. 2.

‡ Plate xc, Fig. 2, and Plate

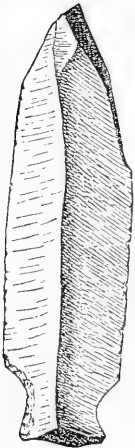
† Plate XCII.

§ Plates XCIII and XCIV.

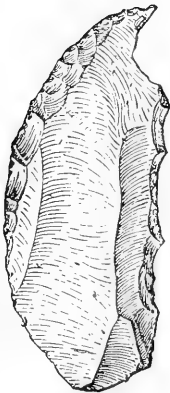
XCI, Figs. 3, 4.



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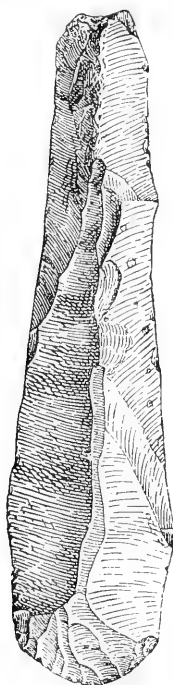
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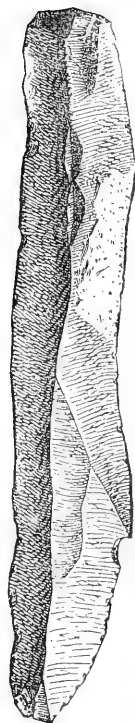
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PALEOLITHIC IMPLEMENTS.

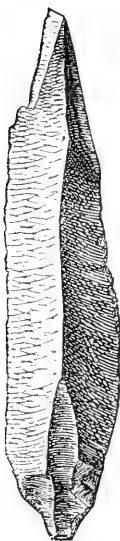
FIG. 1. Grotte du Placard. Charente, France.
FIG. 2. Flint graver. Gorge-d'Enfer, Dordogne, France.
FIG. 3. Flint flake; worked. Les Eyzies, Dordogne, France.
FIGS. 4 and 5. Flint points; worked to an edge. La Madeleine, Dordogne, France.



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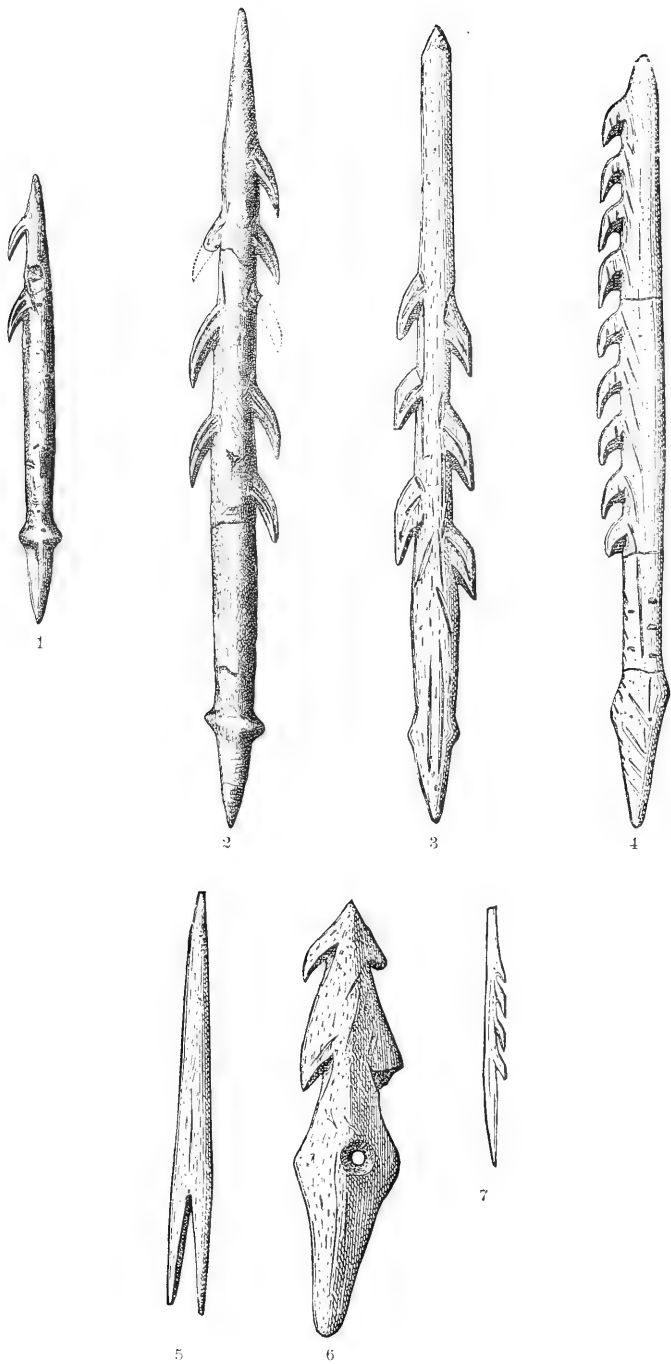
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PALEOLITHIC IMPLEMENTS.

FIG. 1. Flint scraper, with rounded end. La Madeleine, Dordogne, France.

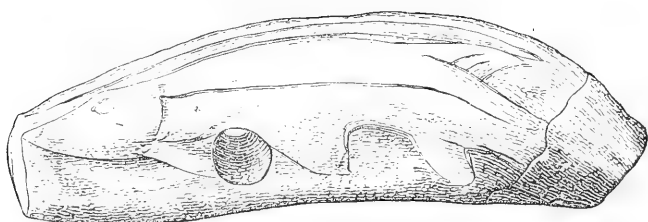
FIG. 2. Flint flake; probably a saw or knife. La Madeleine, Dordogne, France.

FIGS. 3 and 4. Flint graters. La Madeleine, Dordogne, France.

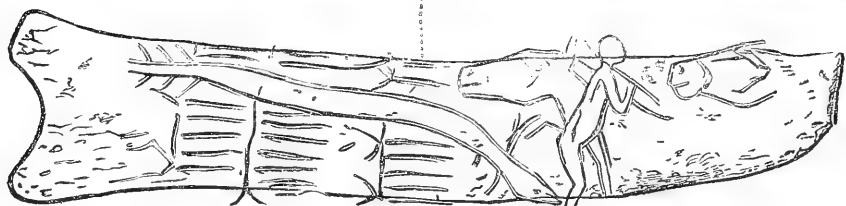
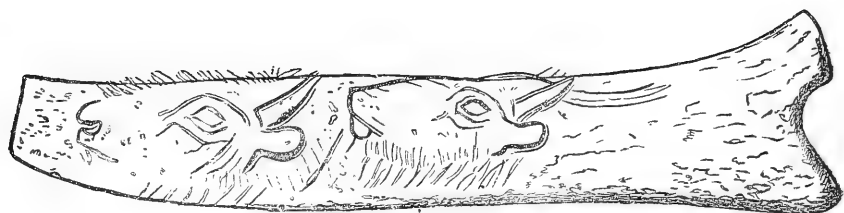


PALEOLITHIC IMPLEMENTS.

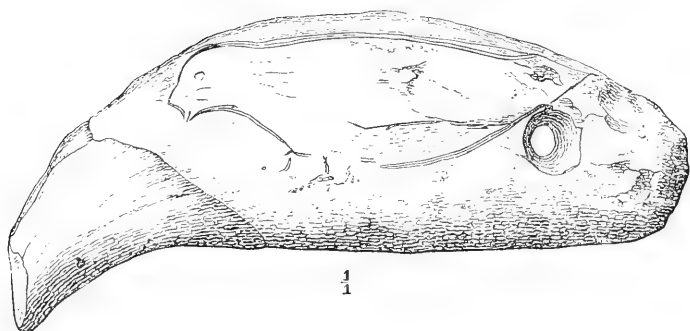
Figs. 1, 2, 3, and 4. Harpoons made of reindeer horn. La Madeleine, Dordogne, France.
Figs. 5, 6, and 7. Points and harpoons made of reindeer horn; hole and slit for attachment to shaft.
Southern France.



$\frac{1}{1}$
1



$\frac{2}{2}$
2



$\frac{1}{1}$
3

PALEOLITHIC ENGRAVINGS.

FIG. 1. Engraving of pike on canine tooth of bear. Grotte of Duruthy, southwestern France.

FIG. 2. Engravings of a man, horses, aurochs, and snake or eel on reindeer horn. La Madeleine, Dordogne, France.

FIG. 3. Engraving of seal on canine tooth of bear. Grotte of Duruthy, southwestern France.

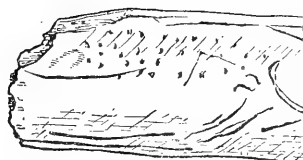
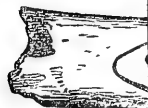
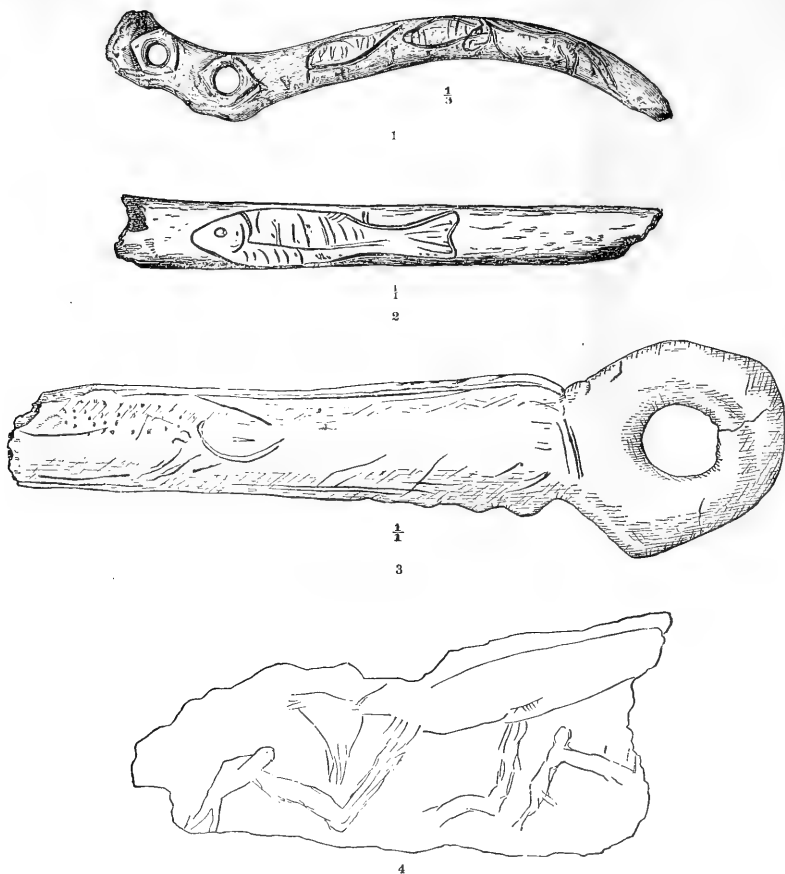


FIG. 1. Baton de commande
La Madeleine
FIG. 2. Reindeer horn;
FIG. 3. Baton de commande
FIG. 4. Rude engravure



PALEOLITHIC ENGRAVINGS.

- FIG. 1. Baton de commandement; reindeer horn, on which are representations of fishes and a horse. La Madeleine, Dordogne, France.
 FIG. 2. Reindeer horn; representation of a fish. La Madeleine, Dordogne, France.
 FIG. 3. Baton de commandement; reindeer horn, with tracing of a fish. Cave of Goyet, Belgium.
 FIG. 4. Rude engraving on scapula of ox. Laugerie Basse, Dordogne, France.

There has also been found an instrument made of reindeer horn, the use of which is as yet unknown. It has been named "*Baton (or stick) de Commandement*," and is supposed to have been some sort of emblem of authority. Their length was such as to require the principal part of a reindeer horn, and from two to three holes about three-fourths of an inch in diameter were drilled through sideways.*

These artistic manifestations are intended not alone for utility, as in the decoration of implements, weapons, and utensils, but they display art for its own sake. Sketches have been discovered which, like those of many artists of the present day, appear to have been purely for practice or for innate love of the work.† They are mere essays, attempts in which the artists have made various efforts on the same piece without any attempted relation one to the other. The piece known as the combat of reindeer, five animals, Marquis de Vibraye's collection, is an example. Another is a sketch of eight animals, horses and deer, from the Cavern of Lartet, Judge Piette's collection. These are each on one piece; the lines run into each other. The animals represented are without relation to each other. They have even been done from different planes, so that some are upside down. Some are complete; others incomplete. The author of these sketches was only utilizing his material, as does the artist of to-day when he puts many studies on the same canvas. The mammoth engraved on a laminated piece of his own tusk, and the bear on a flat pebble, are purely artistic, are done solely for their art; while the sculpture of the mammoth and reindeer, decoration of the handles of daggers and poignards are such utilization as put one in remembrance of like work done by Benvenuto Cellini. Similar illustrations are found in the various "*Batons de Commandement*."

The excellent and artistic work shown in these engravings and sculptures is itself strange enough. But the really wonderful and incomprehensible thing concerning them and the civilization belonging to this epoch is that at the close of the period the entire culture painted on its existence disappeared. It passed away and left no trace. Whatever may be the truth concerning this in other parts of the world, it appears to be certain in its relation to western Europe. This leads one to speak of the close of this period, and what has been called by some of the archæologists the hiatus; that is, the gap between that and the succeeding epoch or period.

I have already shown how the human occupation during the paleolithic period was spread generally over western Europe, but whether the subdivision or epochs according to the classification of de Mortillet extended to and were developed in other countries than France has not been determined, and there were persons of both ways of thinking. On one proposition, however, the archæologists seem to be agreed, that there were subdivisions in the paleolithic period, and they are to be traced and recognized by the differences in the human industry according to

* Plate XCIII, Fig. 2, and Plate XCIV, Figs. 1, 3.

† Plate XCIV, Fig. 4.

their association and superposition. There are many illustrations to be given. The Grotte de Placard is situated on the banks of the river Tardoire, a branch of the Charente in the department of the same name. A cut of this grotte is given in Plate xc, Fig. 1. By its side is shown a section of the grotte made during its excavation. It is drawn to scale and shows the various strata of earth or débris with which the grotte was filled. The top layer was naturally the last in point of time to be laid down; the bottom was just as naturally the first. The divisions in the scale from the bottom to the top represent the various strata found during the excavation and their component parts show by their differences how they were deposited, each one subsequent to the other, and what were the distinctions between the habits or industries of the man who successively occupied the cavern during the filling of the respective strata.

- A.—Strata of small pieces of rock and débris fallen from the roof of the cavern, and separating the archæologic layers: No traces of human industry, and, consequently, man was not present.
- B.—A stratum of the same with a fine streak of clay.
- C.—The top archæologic strata, 38 centimeters in thickness, belongs to the neolithic period for it contained pieces of property, fragments of polished stone flint hatchets, barbed arrow-heads, together with the bones of modern animals.
- D, E, F, and H.—Four strata with the characteristic fauna and objects of industry of the prehistoric period, Madalénian epoch. These four, together with the intermediate strata are nigh 4 meters (5 feet) in thickness.
- J.—A stratum of Solutrian industry of the finer and later order. Flint arrow or spear-heads with shoulder on one end.
- K.—A stratum of the lower or earlier Solutrian with leaf-shaped implements.
- L.—Stratum Moustierian with a characteristic point.

Although this evidence of chronologic and successive occupations can be repeated in many cases, yet it has not been universally accepted, and when accepted it has been with a different classification and nomenclature. The division into epochs according to the classification here adopted is not laid down as a hard and fast rule. It is only tentative and liable to be changed and modified by future discoveries. Whether all these subdivisions of the paleolithic period extended to and were developed in other countries than France has not been determined, and there are persons of both ways of thinking. The principal cause of my willingness to adopt the theory is that it makes a segregation of the objects and implements of the paleolithic period, and gives them a nomenclature by which they can be described and understood; it provides a common language for both hearer and speaker.

The man of the paleolithic period left no monuments. It appears that he built no houses for either the living or the dead. Indeed, it is doubtful if the dead were buried or had any place of sepulcher. The general belief is that he made no pottery. The sole exceptions to this have arisen in Belgium, since the discovery by M. Dupont in the Grotte de Furfooz, and MM. Fraipont and Lohest in the Grotte de Spy.

Portions of the skeleton of paleolithic men are believed to have been found in several places throughout western Europe. It is useless to attempt a full description of them; sufficient for my purpose to say that they have been determined, from investigation of the skull, to have been a long-headed race with retreating forehead and heavy frontal projection. Enough bones have been found to determine that he was of small stature, the extremities being comparatively short but heavy. The sinuses indicate the attachment of heavy muscles, and, consequently, great strength. The typical skulls of this race of men, and which have given their names respectively to it, are that of Neanderthal, the original of which is now at Bonn, and of Cannstadt, which is at Stutgard, both in Germany.

I have said that the human occupation during this period, as indicated by the remains of its civilization, extended generally over the world. What became of man at its close is not at all determined, and has scarcely been studied. In western Europe the scientists have had better opportunities than in this country, and, consequently, have made greater discoveries. It is the opinion of some that there was a hiatus between the two races; others, without admitting this, are equally satisfied of the great differences between the two. The neolithic man, so far as concerns western Europe, must have come from the east, that great foundation of civilization and unknown cradle of the human race. He occupied the same territory which was before occupied by paleolithic man, but what became of the paleolithic man is unknown and a mystery. Whether he migrated to the north, following up the Arctic animals when they took their departure; whether the neolithic man came down upon and exterminated him; whether he drove him off or absorbed the remnants, is as yet unknown. It may never be known, but it is a subject for investigation, and the scientists of these countries are engaged seriously in the work of examination.

On the subject of this hiatus or gap, Mr. John Evans says:

There appears, in this country at all events, to be a complete gap between the river-drift and surface-stone periods, so far as any intermediate forms of implements are concerned; and here, at least, the race of men who fabricated the latest of the paleolithic implements may have, and in all probability had, disappeared at an epoch remote from that when the country was again occupied by those who not only chipped out but polished their flint tools, and who were, moreover, associated with a mammalian fauna far nearer resembling that of the present day than that of the quarternary times.

So different indeed are the two groups of animals that, as has been already remarked, Mr. Boyd Dawkins has shown that, out of forty-eight well-ascertained species living in the post-glacial or river-drift period, only thirty-one were able to live on into the prehistoric or surface-stone period. Such a change as this in the fauna of a country can hardly have been the work of a few years, or even of a few centuries; and yet we must intercalate a period of time sufficient for its accomplishment between the farthest date to which we can carry back the neolithic period, and the close of the paleolithic period as indicated by the low-level gravels. The antiquity, then, that must be assigned to the implements in the highest beds of river-

drift may be represented (1) by the period requisite for the excavation of the valleys to their present depth; plus (2) the period necessary for the dying out and immigration of a large part of the quarternary or post-glacial fauna and the coming in of the prehistoric; plus (3) the polished stone period; plus (4) the bronze, iron, and historic periods, which three latter in this country occupy a space of probably not less than three thousand years. A single equation involving so many unknown quantities is, as already observed, not susceptible of solution.*

And Prof. Boyd Dawkins:

The great changes in the fauna and geography of Britain, at the close of the Pleistocene age, render it very improbable that the cave men were in any way represented by the neolithic tribes who are the first to appear in prehistoric Europe. The former possessed no domestic animals, just as the latter are not known to have been acquainted with any of the extinct species, with the exception of the Irish elk. The former lived as hunters, unaided by the dog, in Britain, while it was part of the continent; the latter appear as farmers and herdsmen after it became an island. Their states of culture, as we shall see presently, were wholly different. We might expect, on *à priori* grounds, that there would be an overlap, and that the former would have been absorbed into the mass of the new-comers. There is, however, no evidence of this. * * *

From the facts at present before us we may conclude that they belonged to two races of men, living in Europe in successive times, and separated from each other by an interval sufficiently great to allow of the above-mentioned changes taking place in the physical conditions of Britain. * * *

From the preceding pages the reader will gather a distinct idea of the physical condition of Britain in the neolithic age, and of the manners and customs of the inhabitants. The population was probably large, divided into tribal communities possessed of fixed habitations, and living principally on their flocks and herds, acquainted with agriculture, and subsisting in a lesser degree by hunting and fishing. The arts of spinning, weaving, mining, and pottery-making were known, and that of boat-building had advanced sufficiently far to allow of voyages being made from France to Britain, and from Britain to Ireland. Traffic was carried on by barter, and stone axes were distributed over areas far away from those in which the stone was found. Tombs also were built, some of imposing grandeur, for the habitation of the dead in the after-world, in which the spirits were supposed to lead a life not very different from that of the living, and at which they were worshiped by the family or tribe, after the manner of the red Indians and many African peoples. * * *

The neolithic implements and the domestic animals and plants, described in the preceding pages, have been discovered over the whole of Europe, with the exception of northern Russia and northern Scandinavia. They imply that the neolithic civilization was long established, and that it underwent so little change, if any, in the lapse of ages that no traces of a change have been preserved to our times. Its duration varied in different countries, and it yielded place to a higher culture in Greece and Italy long before it passed away from central and northern Europe. * * *

The introduction of this civilization is the starting-point of the history of the present inhabitants of Europe. To the neolithic peoples we owe the rudiments of the culture which we ourselves enjoy. The arts which they introduced have never been forgotten, and all subsequent progress has been built upon their foundation. Their cereals are still cultivated by the farmer, their domestic animals still minister to us, and the arts of which they only possessed the rudiments have developed into the industries—spinning, weaving, pottery-making, mining; without which we can scarcely realize what our lives would be.†

* Evans: *Ancient Stone Implements of Great Britain*; p. 618.

† W. Boyd Dawkins: *Early Man in Britain*; p. 265, etc.

Monsieur Gabriel de Mortillet in *Le Préhistorique*, page 479, discusses this hiatus between the paleolithic and the neolithic periods. He considers that the former belonged to the quaternary geologic period, while the latter belongs to the present, or period actual. He says that "Between these two epochs (that is, between the Madalenian epoch and the neolithic period) "there are differences everywhere; there exists a veritable revolution." And he puts in the form of a table, side by side, the differences.

(1) In the Madalenian the climate was cold and dry, with extreme temperatures.	(1) In the neolithic period the climate was temperate and uniform.
(2) Existence of the last grand fossil species—the mammoth.	(2) The mammoth extinct.
(3) Chamois, marmot, the wild goat in the plains of France.	(3) Chamois, marmot, and wild goat have gone to the summits of the mountains.
(4) Reindeer, saiga (antelope), elk, glut-ton, white bear, in the center of Europe.	(4) These animals have emigrated toward the Arctic region.
(5) Hyena and the grand cat tribe.	(5) No hyenas or grand cats.
(6) No domestic animals.	(6) Domestic animals abundant.
(7) Human type uniform.	(7) Human type much varied.
(8) Population nomadic.	(8) Population sedentary.
(9) Hunters and fishers, but no agriculture.	(9) Agriculture well developed.
(10) Stone implements always chipped.	(10) Stone implements polished.
(11) No pottery.	(11) Pottery.
(12) No monuments.	(12) Monuments: Dolmens and menhirs; burial of the dead.
(13) No burials; no respect for the dead.	(14) Religious ideas well developed.
(14) No religious ideas.	(15) No artistic sentiment.
(15) A profound and pure artistic sentiment.	

This revolution is at once physical and industrial, natural and social. In the physical or natural there have been great changes in the climate, which proves changes of equal importance in the orography and geography, which in its turn was followed by profound geologic modification. This could be done but very slowly, and, therefore, there must have existed a long period of time between the two epochs. This can be assured by certain proofs. In the Grotte de Placard one can see between the uppermost stratum, containing implements of the Madalenian epoch, and that which contains implements of the neolithic period there is to be found a depot or stratum of fallen rubbish, principally small stone from the roof of the cavern, which is completely sterile, so far as concerns archæology, and is 70^{cm} in thickness. The Cavern of Laugerie Haute gives the same evidence and is even more conclusive. Between the strata of the two periods there exists a sterile stratum of 1.30^m. In the Grotte de la Vache there exists a thick stratum of stalagmite, sometimes 45^{cm}, between the Madalenian epoch and the neolithic period and the same difference exists between the industrial and

social cultures of the two epochs. The table just given, and which need not be repeated, shows the industries and customs of the two epochs to have nothing in common. There was a substitution complete of the former by the latter. The more advanced have entirely replaced the primitive. It has produced a phenomenon analogous to that which took place in America or the Oceanic Islands after the arrival of the Europeans. There is no progressive or local development, but an invasion of a superior civilization. There are the same changes in the races of the men of the two epochs, but, by atavism, we may find the type of the Chellian man reproduced in the neolithic period. If this be established by future discoveries, it would tend to show a contact of the two populations and that the hiatus was not real, but only a gap in our knowledge of the civilizations of the two peoples.

NEOLITHIC PERIOD.

There was a marked improvement in the civilization of this period over that of its predecessor, the paleolithic. This extended to many things, but the distinguishing feature was the art of polishing or smoothing the stone implements and weapons. Therefore it has been called the polished stone age.

The characteristic implements of this period are the polished stone hatchets, called celts in England and America. They are found like the paleolithic Chellian implements, which preceded them, substantially all over the world, thus showing that this civilization must have endured for a long period of time and comprised an extensive population. The materials differ according to locality, and the form may vary with the requirements of the material.

The standard hatchet in Alaska is made of nephrite, that of the West Indies may be made of shell; there may be also slight differences of form, some having a square top, others being pointed. The Scandinavian hatchets are usually square in section and therein are different from others; they are also much longer, but this arises from the peculiarities of the material. The general likeness in these implements prevails throughout the world notwithstanding the minor differences mentioned. While an experienced prehistoric archæologist may be able to determine from an inspection of the polished stone hatchet from what country it comes and possibly to what locality it belongs, yet the statement is true that they are substantially the same implement and that the invention of the art of polishing, together with the form of hatchet, has passed by communication from people to people, country to country, and descended from generation to generation until it has spread everywhere. A series of the polished stone hatchets, or celts, from almost any one of the United States will stand as a fair representative of the same implement in any other State or country. The single exception to the universality of this statement is from Scandinavia. I shall not at present attempt any general description of the implements, weapons, or ornaments of

this period. That will be reserved until I come to speak of those from the United States, when it can be done more in detail and will not be a repetition.

The stone arrow or spear-head or knife is another equally characteristic implement or weapon of this period. The North American Indian was in the neolithic period of the civilization at the time of the discovery of the continent by Christopher Columbus. Although he used copper as a material for implements, yet it did not displace stone nor was its use sufficiently extended to establish an age of copper.

Another characteristic of the neolithic period was its monuments. Their erection and construction by man began in this period, and are therefore its oldest representatives in every country. In the United States they consist of mounds and earthworks, likewise stone and other forts. In western Europe principally of dolmens, menhirs, cromlechs, and alignments. I will not attempt any description of the monuments of the United States further than to say that many of them are believed to have been places of sepulture. Some of the forts, from their appearance and location, seem to have been erected as places of defense or for safety. But there are vast numbers both of mounds and earthworks which would seem so illy suited for the respective purposes indicated as that it is difficult to believe they were so intended. Many theories and arguments have been presented, but much of it has been of that kind which darkeneth wisdom by words without knowledge.

The excavations into the mounds and other prehistoric monuments in the United States have been unfortunately made more in pursuit of trinkets and to add numbers to the owner's collection than in the interest of science or for the purpose of discovering the history, customs, or civilization of the men who made the mounds. Any description at this time would necessarily be imperfect, and probably all who read this pamphlet will have had as much general and indefinite knowledge of these monuments as could be here given. Those who would know more concerning this subject must be referred to the special works treating thereon.

DOLMENS.

The neolithic monuments of western Europe may be briefly described.

The dolmen was made in the form of a chamber or series of communicating chambers or alley-ways with sides, floor, and covers, and was a tomb.* Its floor and entrance were at about the level of the neighboring surface, and the entire monument is believed to have been covered with earth; thus in ancient times it was a tumulus.†

The covering stones of a dolmen have been found to weigh 5, 10, 20, and 40 tons.‡ Used for sepulture they may be described as houses for the dead. They are perhaps the earliest form of receptacle for the dead, although the Kistvaen, made of smaller flat stones with sides, ends, top,

* Plates xcv to xcix.

† Plate xcvi, Fig. 1.

‡ Plate xcvi, Fig. 1, and Plate xcvi, Fig. 2.

and bottom shaped like a box or chest (Kist) and covered with stones like a cairn, may be older, but they may also have only been the sepulchres of a poorer people.

The dolmens, usually square but sometimes round, were made in the form of chambers, sometimes as small as 4 by 6 feet, 4 feet high; sometimes these were 16 feet wide, 30 feet long, and 8 feet high. Most of the dolmens consist of a single chamber, but many have as many as six lateral chambers. They are made of huge flat unhewn granite stones, which are stood on end or edge to form the sides and ends of the chambers.* The covering stones (which are called tables) are large, and a single one is sometimes sufficient to cover the entire monument.† The dolmens usually have a gallery or corridor leading to the chamber, made in the same way. This is for approach to the chamber. This gallery is about 3 or 4 feet wide and as many or more high, sufficient for a man to make easy entrance. It is sometimes blocked with another slab of granite at the inside and nearest the chamber, sometimes at the outside, and sometimes both. Fig. 2‡ will explain this. In this example the door has fallen in. Their orientation is irregular. They open in every direction, north and south, east and west; but there are more to the south than to the north, and more to the east than to the west. The greater number open towards the southeast. For purposes of comparison the ground plan of several of the important dolmens are here given.§ It will be perceived that though they are all one general type, yet no particular or precise form has been invariably followed in their construction. Each one has its own individuality and differs from any other.

The fine unshaded lines indicate the covering stones. The direction of the opening is indicated by letters SSE, etc.

(1) Dolmen of Kerlescant, at Carnac. This opens to the west. This dolmen is what is usually denominated *Allée couverte*.

(2) Dolmen of Kervilor, at Trinité-sur-Mer. Opening to SSE., one side square and one side round.

(3) Dolmen du Rocher, at Plougoumelen. Opening to SSE.

(4) Dolmen of Crucuno—same as Fig. 1.¶ Opening to SE., chamber rectangular.

(5) Dolmen of Keroed-Kerzu, at Crach. Opening to east, circular chamber.

(6) Dolmen of Ben-er-Groah, at Lochmariaquer. Opening south, two successive circular chambers.

(7) Dolmen of Kervihan, Carnac. Two chambers, semi-circular, with alley between. Opening SSE.

(8) Dolmen of Keriaval, near Plouharnel-Carnac. Three lateral chambers, opening east.

(9) Second dolmen of Manè Kerioned, near Plouharnel. This is one of three in the same tumulus—side by side—opening south, and is elaborately sculptured on the face of the supports.

(10) Three dolmens of Rondessec, at Plouharnel, all under the same tumulus, opening SSE. In one of these was found a pair of gold bracelets, one of which is still to be seen at Pere Gaillard's, Plouharnel.

(11) Small type dolmen of Kermario, Carnac. Opening to southeast.

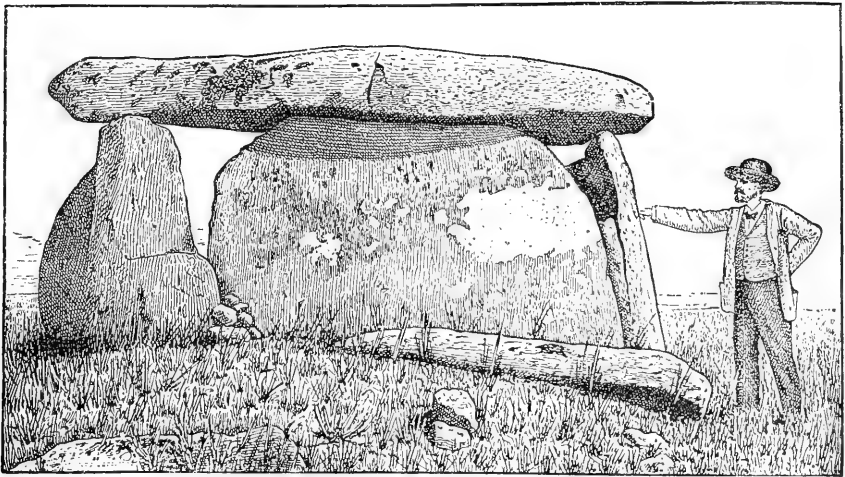
* Plate xcv, Fig. 1; Plate xcvi, Fig. 1.

† Plate xcvi, Fig. 2.

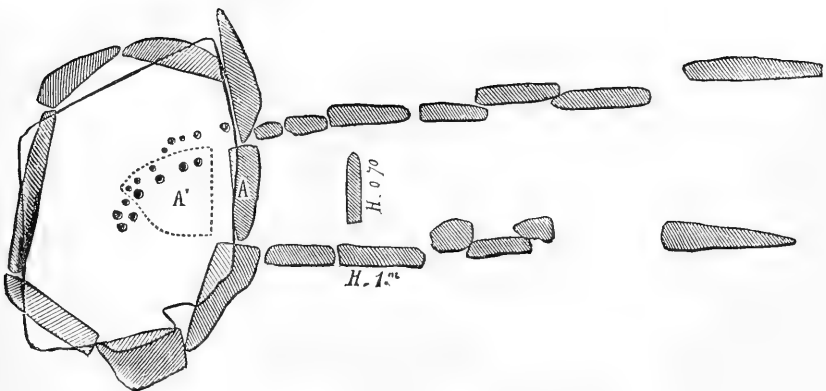
‡ Plate xcv.

¶ Plate cvii.

§ Plate xcix.



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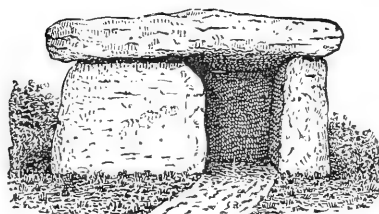
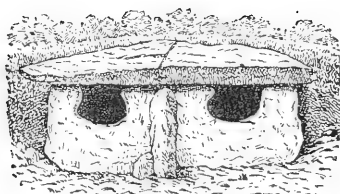
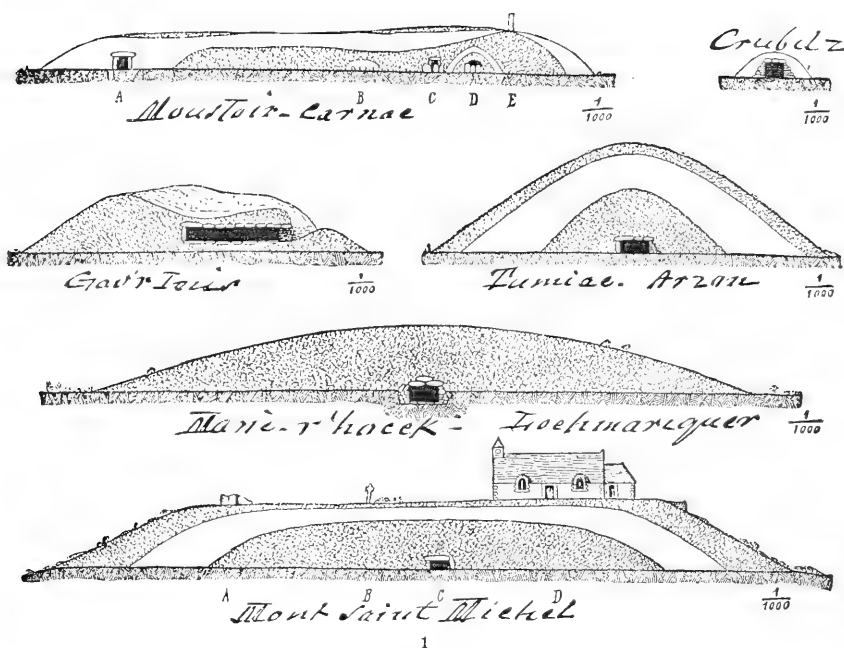


2

NEOLITHIC MONUMENTS—DOLMENS.

FIG. 1. Dolmen of Palo de Vinha, Portugal.

FIG. 2. Ground plan of dolmen of Palo de Vinha, near Evora, showing the stones on edge forming the gallery, chamber, and door. The light line around shows the covering stone with a group of cup-markings on the under side.



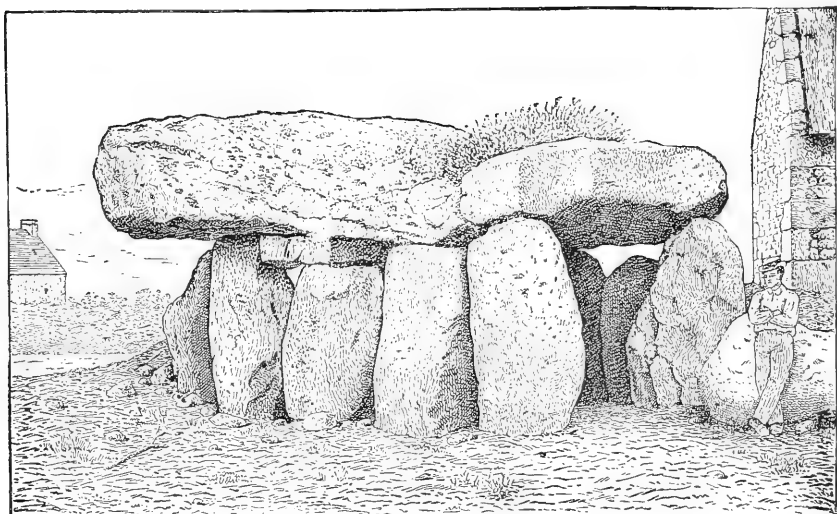
NEOLITHIC MONUMENTS—TUMULI AND DOLMENS.

FIG. 1. Tumuli in Brittany.

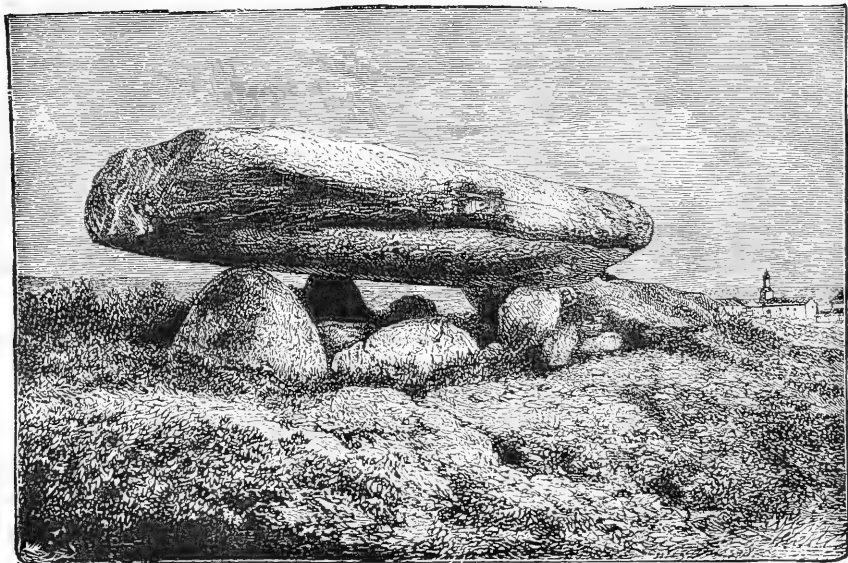
FIG. 2. Dolmen d'Ala Safat, Palestine.

FIG. 3. Double dolmen, near Veevajapett, southern India.

FIG. 4. Dolmen de Thizay, Indre-et-Loire, France.



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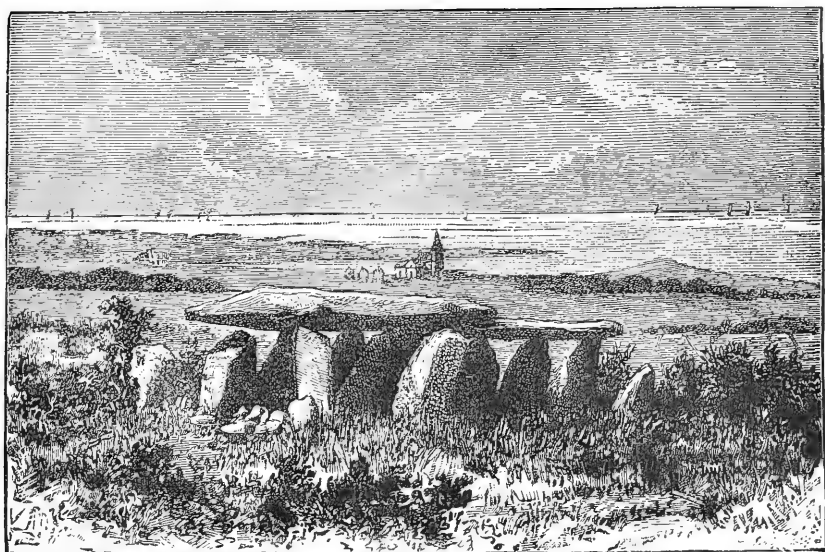


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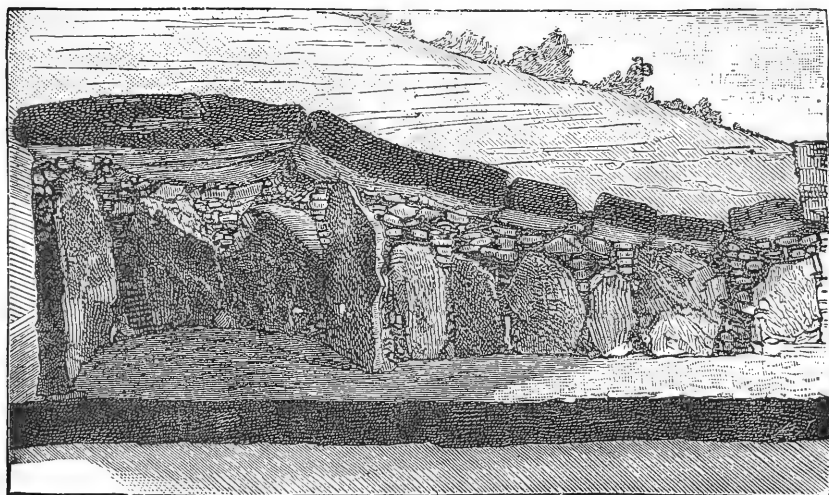
NEOLITHIC MONUMENTS—DOLMENS.

FIG. 1. Dolmen of Crucuno, Morbihan, Brittany.

FIG. 2. Dolmen of Lochmariaquer, Morbihan, Brittany.



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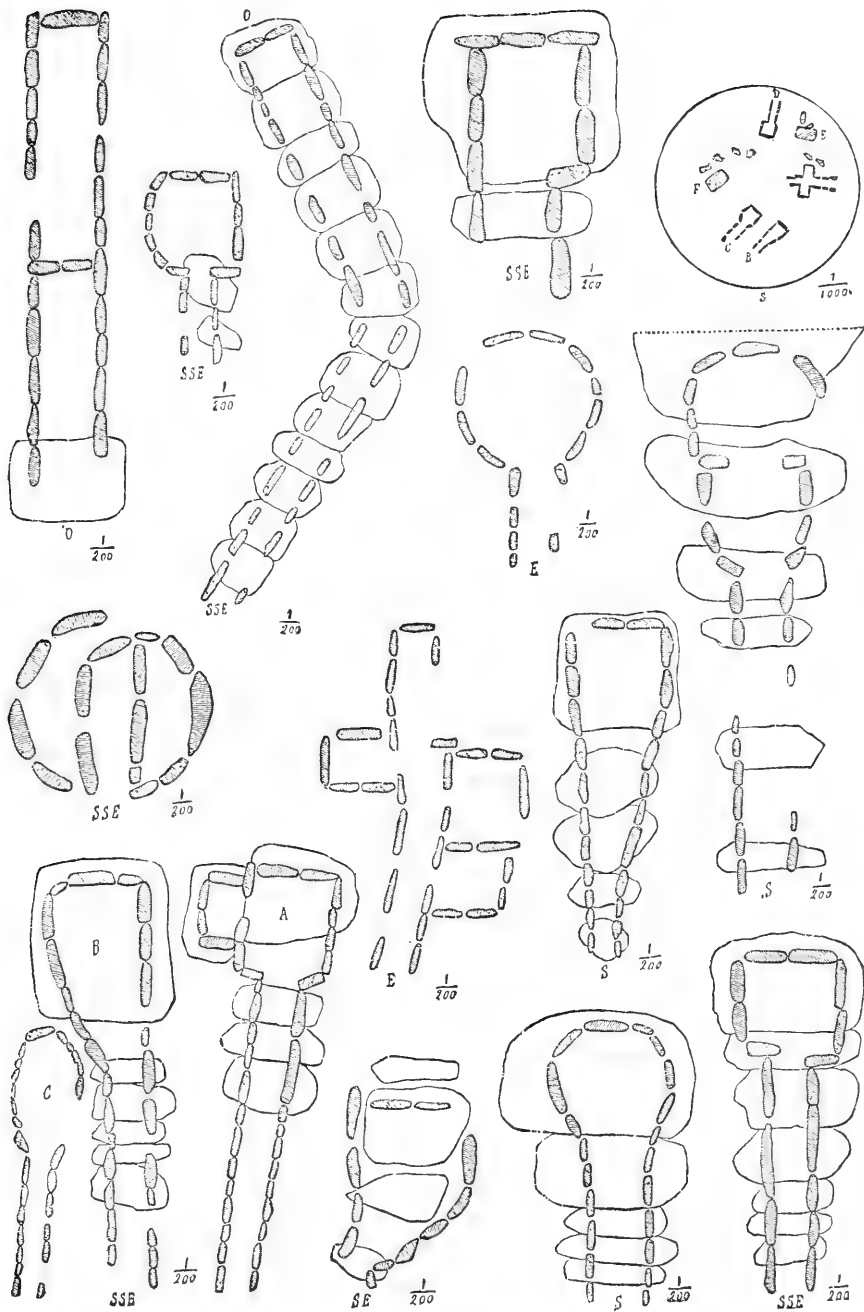


2

NEOLITHIC MONUMENTS—DOLMENS AND TUMULUS.

FIG. 1. Dolmen of Grand Island.

FIG. 2. Dolmen and tumulus of Kercado near Plouharnel-Carnac, Morbihan. Section showing the chamber and the corridor or covered way by means of which second and subsequent interments were made.



NEOLITHIC MONUMENTS—GROUND PLANS OF DOLMENS IN BRITTANY.

(12) Dolmen of Manè Lud, at Lóchmariaquer. Opening south.

(13) Dolmen (with tumulus) of Kercado, Plouharnel, SSE.

(14) Tumulus of Pornic, Loire-Inférieure, in the upper right-hand corner. This contains several dolmens opening in different directions. A opens to the east. B and C to the southwest. D to the north. E and F in ruins.

It is believed that the interments were made continuously in the same sepulcher (as is done partially in our own vaults), a practice which prevails to a certain extent in the country to the present day. When the dolmen or tomb became full, the skeletons could have been taken out and deposited in an ossuary.

It was once the fashion to speak of these monuments as having belonged to the Druids. This seems to have been a tradition that has grown up within historic times and long after the Druids had passed away. The dolmens belonged as well to the age of bronze as to that of polished stone. Incineration and inhumation were both customary, but the former method pertains more to the bronze age.

There are about thirty-five hundred dolmens in France. They are plentiful in the center, south, and west, but rarer in the north and east; plentiful in Great Britain and Ireland, in Spain and Portugal, in Denmark and Sweden; some in Belgium and Holland, the Rhine country, and Western Germany; none in Norway; almost none in Italy; none in Eastern Europe. The city of Dresden marks about the dividing longitudinal line. They are found on the coast of Northern Africa between Morocco and Tripoli, in Palestine, in Asia, in South and Central America, but not in North America.

Many of the dolmens are now covered with earth, and these have been called tumuli. It is believed by those best qualified to judge, after the longest experience and closest examination, that all have been at one time so covered. One reason for this belief is that it is universal to find the gallery, corridor, or covered way made of the same kind of stones in the same way, on the same level, and leading from the principal chamber, gradually narrowing in both width and height to what would appear to have been the circumference of the tumulus. In this regard the dolmen now without a tumulus corresponds exactly with those covered by one. Some of these corridors are 40 and 50 feet in length. In this way the tomb could be covered, the monument completed, and yet the entrance be easily opened and entered upon the occasion of a second or subsequent interment.

The covering of these tumuli consists of layers of broken granite alternated with layers of clay and mud from the seashore and vegetable earth from the neighboring surface.

The tumulus of Gav'r Inis has a dolmen remarkable for the sculpturings. It is 8 feet by 7, 5 feet 8 inches high, with a corridor or alley 14 feet long, 4 feet 6 inches wide; 5 feet 4 inches high, while the tumulus crowning it is 180 feet in diameter and was 30 feet high. (See Plate xcvi.)

Tumiac at Arzon is 100 feet in diameter and 65 feet high; Manè-r-

'hoeck is 300 feet in diameter and 30 feet high; Mane Lud 300 feet long, 150 wide and 30 feet high; Mont Saint Michel 320 feet long, 120 feet wide and 80 feet high; Kercado is about 100 feet in diameter and 20 feet high.

MENHIRS.

The dimensions of some of the menhirs is as follows:

Penmarck, 25 feet high;* Cadiou, 28;† Mount Dol, 31; Plouarzel, 36½; Plesidy, 37, and Lochmariquier, 67½. The latter, fallen and broken, is 13½ feet wide and 7½ feet thick, and weighs 347 tons. There are seven hundred and thirty-nine of these in Brittany. The menhir stands single and alone. When arranged in parallel lines, as they sometimes are, they are called alignments.

ALIGNMENTS.

The Province of Brittany has twenty-three alignments—one-half of those in all France. The department of Morbihan and Finistère have, together, seventeen of these. Carnac has in its immediate neighborhood six out of these seventeen. These six alignments represent three thousand menhirs.

Menec, near Carnac, has eight hundred and thirty-five menhirs, arranged in eleven parallel lines, 3,778 feet in length, and 328 feet in breadth at the head, tapering to 200½ feet at the tail. It has at its head a cromlech of sixty-two menhirs.

Kermario has six hundred and seventy-eight menhirs, no cromlech, nine parallel lines, 4,037 feet in length—same width as Menec.

Kerlescant has two hundred and fifty-eight menhirs, a cromlech square of thirty-nine menhirs, thirteen lines, 1,000 feet in length—393 feet width at the head and 164 at the tail.

Erdeven has thirteen lines, one thousand one hundred and twenty menhirs, 6,886 feet in length, 836 in width at the beginning, and 180 at the end.

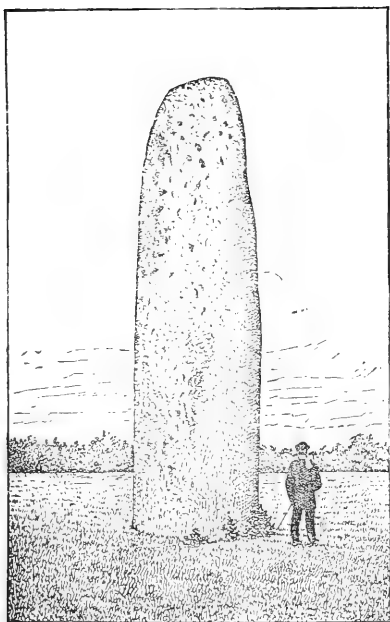
About one-half of these have been overthrown and are lying on the ground. Nearly 10 per cent. should be added for the menhirs known to have been destroyed in modern or historic times. Without doubt the gaps now existing were once filled. This would double, at least, the number. These monuments have served as stone quarries for the neighborhood, and doubtless the great castles and churches of the early ages were built therefrom.

There is on the menhirs no mark of tool or quarrying, yet I think they were quarried. They are so much weathered that all marks are worn away. Look at the weathering on the top of the menhir of Penmarck (Pl. c, Fig. 2). No traces of a quarry have been discovered, though the granite of which the menhirs are formed is the local rock, coming always and many times quite to the surface. The menhirs have evidently been planted. In most cases they stood on the surface with-

* Plate c, Fig. 2.

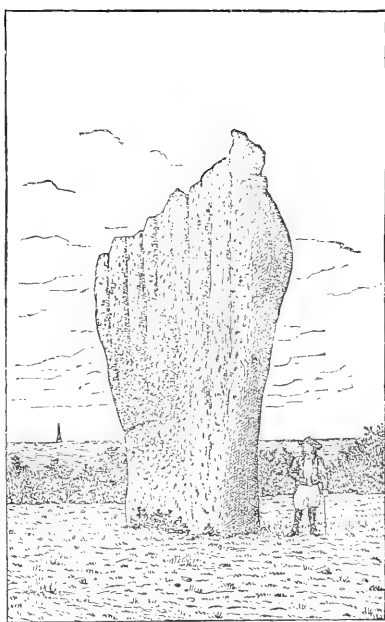
† Plate c, Fig. 1.

‡ Plate c, Fig. 3.



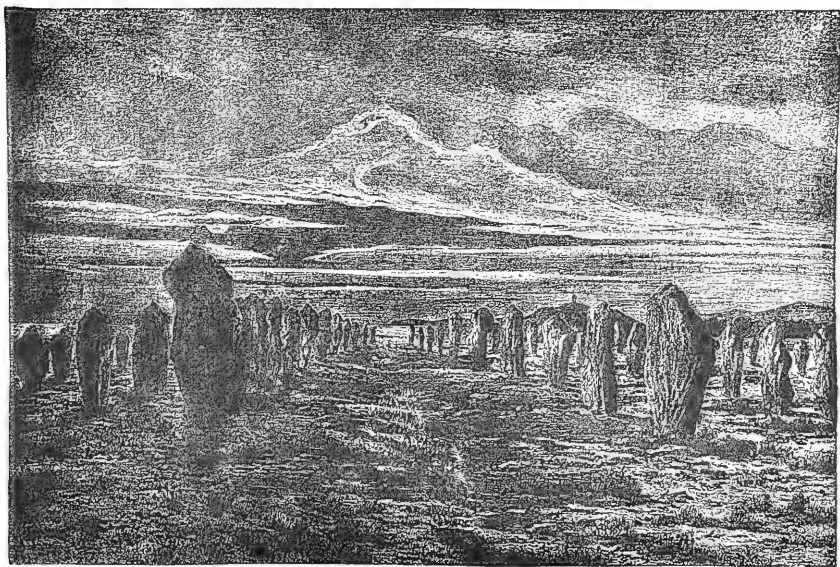
Menhir of Cadiou

1



- of Penmarck

2



3

NEOLITHIC MONUMENTS—MENHIRS AND ALIGNMENTS.

FIG. 1. Menhir of Cadiou.

FIG. 2. Menhir of Penmarck.

FIG. 3. Alignment of Menec, near Carnac.

out any foundation, but foundations had been built where needed. In many cases the smaller end of the stone was downwards.

Flint implements and chips, and broken pottery are found about and among the alignments as elsewhere over the country, especially around the foot of the menhirs, showing a prehistoric occupation; but no traces of the use or purposes of the menhirs or alignments have ever been discovered. There have been many theories broached but no facts adduced sufficient to support them. They have been called military camps or religious or other rendezvous for the people. They may have been tents. No trace has been found of their use as burial places, and so far as established by ascertained fact, the popular idea is as near the truth as any other, viz., that they were the columns of a sacrilegious invading army, turned to stone by the wrath of an offended God.

SCULPTURINGS.

Many of these stones or monuments have marks or sculpturings on them. The menhirs of the alignments have cup markings only, and these are rare. In some cases they have been marked in modern times with crosses, made sometimes by religious devotees, sometimes by the priests, done in order to prevent or break up any chance remaining pagan custom of worshipping, revering, or employing these stones. The dolmens are marked with various signs. These might be set out in full but for want of space, though none however have any discovered signification.

LAKE DWELLINGS.

Switzerland is the country of lake dwellings, because it abounded in lakes, and the mountains were not inviting dwelling places; but lake dwellings extended over the adjoining districts of France, Italy, and Germany, were similarly situated, and they have lately been found in Scotland.

The lake dwellings were, as their name imports, human habitations on the lakes. They were built near the shore, consisted of houses, and possibly other structures, such as shops, barns, stables, granaries, erected on piles placed in the lake bottom, and which, standing above the surface of the water, were cut to a general level and then floored over for the entire settlement. The houses were connected with the mainland by a bridge (probably with a draw), the piles of which it was constructed being often found.

There have been differences of opinion as to the houses. Keller supposed them to have been square or a parallelogram, while Dr. Gross believes them to have been round. They were destroyed before the beginning of history, and practically all that is known of them is derived from the discovery of the relics. The water has preserved the piles so that they are frequently visible from the surface, though they are usually decayed to the surface of the earth at the bottom of the

lake. Many times, as at Robenhausen, the lake has filled up with peat and turf, and the piles and other objects are only found by digging.

Such is always the case with the *terremare* of northern Italy. These were probably lake dwellings similar to those of Switzerland. The evidence of the use of piles is manifest, and from the relics found it is believed that they were contemporaneous in time and in civilization.

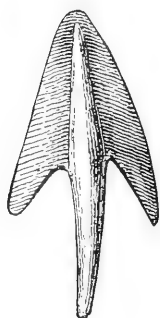
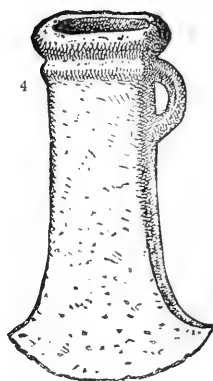
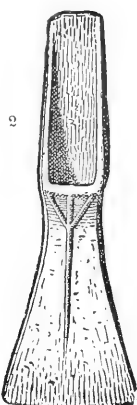
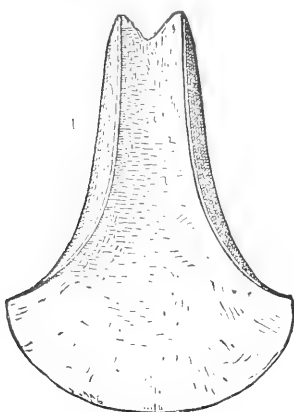
The greater number of lake dwellings are supposed to have been over the water, although near the shore and where it was shallow, but many (the number can not be estimated, owing to the greater facility for decay and destruction) were on the mainland.

The era of lake dwelling forms no epoch in itself; they were only the incidents of location. The dwellings on a given spot may have been removed again and again, even in the same age, the preceding settlement having been destroyed, possibly by fire, possibly by an enemy. At Robenhausen, which station has given its name in France to the neolithic age, there were three prehistoric occupations, one on top of the other, and each was destroyed before the next began. The tops of each set of piles are from 3 to 5 feet higher than the earlier set. The number of houses in the first occupation has never been estimated; that of the second has been estimated at thirty, and the third and last at fifty houses. The settlement covered nearly three acres and contained about 100,000 piles.

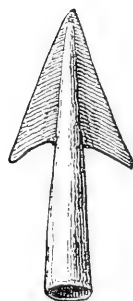
Keller reported in 1879 one hundred and sixty-one prehistoric lacustrine stations, and I can suppose the number discovered has doubled since then.

The occupation of the lakes for dwellings continued through the bronze and iron ages, as well as during that of stone. These different occupations were not always continuous, perhaps never were. In many places, notably at Morges, on Lake Geneva, there are three different stations occupied by prehistoric man, each independent of the other—all within a space of 500 or 600 yards. The first was called "The Church," the implements of which were all stone—no metal; the second, Roseaux—a mixture of stone and the straight flat bronze hatchets belonging to the earliest period; the third, the great city of Morges, in which the implements found, to the number of five or six hundred, all belonged to the fine age of bronze—no stone. Here there could have been no contemporaneity—no mixture. Each must have been destroyed before the other began. That this could be, is proved from what we know from history, for the present town of Morges has existed for a thousand or fifteen hundred years, until 1854, without a suspicion that these other three towns had consecutively existed on its site.

In the Lake of Geneva there are fifteen or twenty stations belonging to the neolithic age and twenty-five or thirty to the bronze age. In the common cantonal map there is shown in Lake Bienne two stations of the stone age, four of bronze, and four of iron—in Lake Morat five of stone, four of bronze, and two of iron—in Lake Neuchatel nineteen of



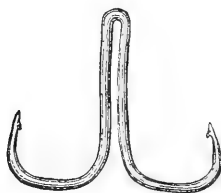
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BRONZE IMPLEMENTS.

- FIG. 1. Bronze hatchet (first style); standard type.
 FIG. 2. Bronze hatchet (second style); standard type.
 FIG. 3. Bronze hatchet (third style); standard type.
 FIG. 4. Bronze hatchet (fourth style); standard type.
 FIG. 5. Bronze arrow-point; stemmed.
 FIG. 6. Bronze arrow-point; socketed.
 FIG. 7. Bronze fish-hook; single barb
 FIG. 8. Bronze fish-hook; double-barbed.

stone, sixteen of bronze, and four of iron. This is highly imperfect, for I know many stations not noted, and where noted as one they really include several stations. At Chevroux, Lake Neuchatel, I found twelve stations, of which seven belonged to the neolithic and five to the bronze age, yet they are noted at only one of each. An idea of the extent of these stations may be obtained from the fact that they contain from ten thousand to one hundred thousand piles. I drew one out at Estavayer, Lake Neuchatel, and brought it home, and it and its cast are now in the Smithsonian Institution. At the station of Wallishofen, Lake Zurich, discovered about three years since, there have been found no less than two thousand bronze hair-pins, some long with large and beautiful heads, which, when polished to their original gold color, must have given a gorgeous appearance to the female head-dress of that age.

BRONZE AGE.

So called because bronze was the material of which the cutting implements were made. The progress in its manufacture is plainly indicated in both form and method. The material is not a natural primitive one, but a combination of copper and tin in varying proportions of 9 to 1. It was not made in Europe, but seems to have been brought from Asia, and was used over many times by recasting. No less than fifty-seven foundries of bronze have been discovered in France, and a proportionate number in Italy, the one at Bologna having no less than fourteen thousand pieces broken ready for melting and recasting. The people of the bronze age in Europe were the descendants of those of the neolithic age, and their hatchets were at first made in the same general form as the polished stone hatchet of their ancestors. They were straight, flat, thin, and made by hammering. Increased strength was obtained by hammering the edges into projections which afterwards increased to wings. This was the second step of progress. Then the hatchets were cast in moulds with wings and a stop which prevented the splitting of the handle. Lastly was invented the socketed hatchet, into which the handle (bent at the poll) was inserted. Nearly all the latter forms had an eye with a hole therein, on the inside of the hatchet, by which it could be lashed to the handle which prevented the edge from working outwards.*

PALEOLITHIC IMPLEMENTS IN AMERICA.

The paleolithic implements of the United States are similar to those of Europe in form, appearance, and mode of manufacture, though not usually so well finished. If classified according to Mortillet, they would belong to the earliest epoch of the paleolithic period—the Cheléen. The investigations concerning these implements have not been very profound, nor has it been settled to the satisfaction of all prehistoric archaeologists, perhaps not even to a majority, that they are truly paleolithic implements. There have been various contentions concerning this.

* Plate CI, Figs. 1, 2, 3, 4.

They have been discovered in almost every State of the United States, and if they be accepted as such, their presence would prove the occupation of America by man during that period. This presence and occupation, and the consequent antiquity seems to have been established by the discovery of implements of human manufacture which it is not possible to avoid calling paleolithic, at various localities in the United States. These implements have been found to the number of several hundred by Dr. Abbott in the gravels of the Delaware River, as they were washed from the glacial terminal moraine and deposited at Trenton, New Jersey; also by Miss Franc E. Babbitt, in the gravels of one of the terraces of the Mississippi River, at Little Falls, Minnesota. Similar implements have also been found in the gravels of the Little Miami River, at Loveland, Ohio, in White River, Indiana, and in the Columbia gravels of the railway cuts south of Chester, Pennsylvania. The association and condition of these finds would seem to satisfactorily establish the antiquity of man's occupation in this country. Similar implements have been discovered on the surface in almost every State.

A circular, No. 36, was issued by the Smithsonian Institution in January, 1888, in which the following questions were put for information concerning these implements:

Question 1.—How many of these rude stone implements have you in your collection?

Question 2.—Of what material are they made?

Question 3.—Where have they been found?

(1) As to locality.

(2) Position, condition and associated with what objects.

(3) Whether on or under the surface, and if so, at what depth, and in what kind of geologic formation.

(4) Were they found in mounds, tombs, or other ancient structures.

(5) Were any other ancient implements found with them, and if so, of what kind.

(6) Did their deposit seem to be accidental or intentional.

(7) Have they been described in any publication, and if so in, what, and where can it be obtained.

(8) Can you forward specimens (as many as possible) to this Museum in exchange for publications or duplicate specimens.

Answers and information responding to these questions not heretofore given are still desired, to the end that the record may be kept up.*

Cuts of certain paleolithic implements were given for information and comparison, among which were the following:

* The information received up to date in reply to this inquiry is embodied in a paper in this report entitled "Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age."

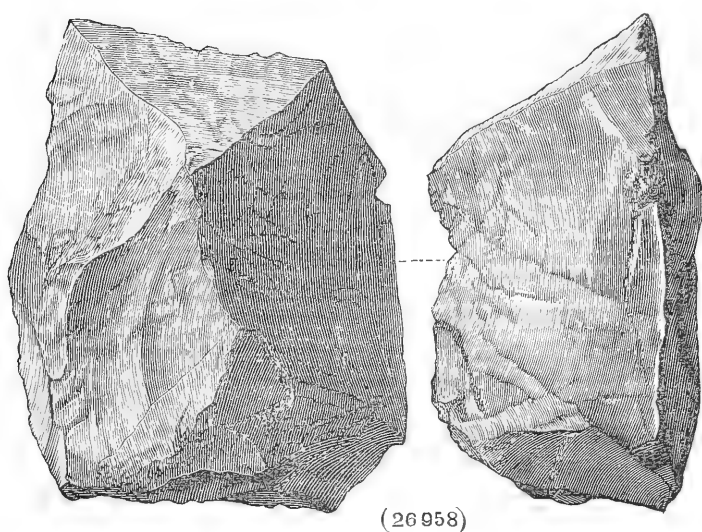


Fig. 1.

JASPERY FLINT.

(Trenton gravels, New Jersey. Received from Dr. C. C. Abbott.)

Primitive Industry: Chap. XXXII, p. 471.

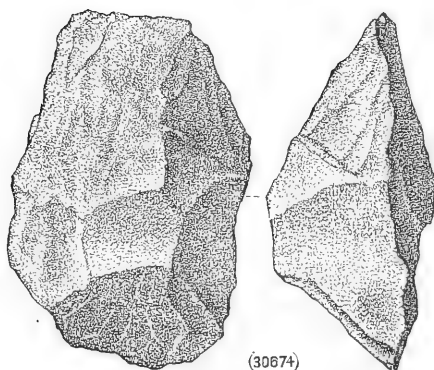


Fig. 2.

GRAY QUARTZITE.

(Banks of the Schuylkill, Berks County, Pennsylvania. Received from A. F. Berlin.)

American Antiquarian: Vol. I, p. 10.

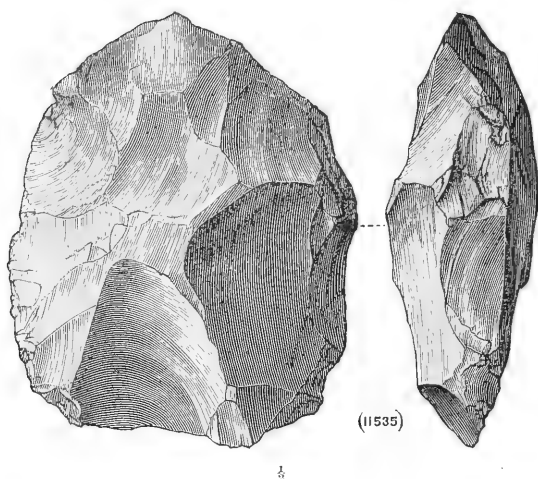

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Fig. 3.

BLACK FLINT.

(Wyoming Territory. Collected by Dr. Joseph Leidy.)

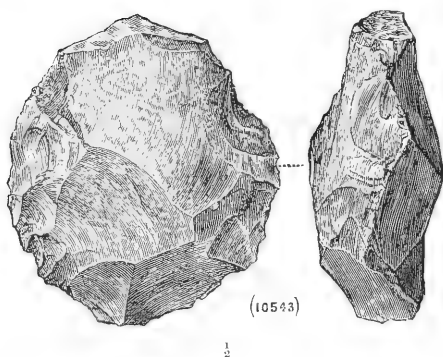

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Fig. 4.

BROWNISH-YELLOW JASPER.

(Wyoming Territory. Collected by Dr. F. V. Hayden.)

These two implements* came from the Bridger Basin in the Uintah Mountains in southwestern Wyoming and Northern Utah, explored by Professor Hayden and Dr. Joseph Leidy. Report of the U. S. Geological Survey, 1872, p. 652.

* See Figs. 3, 4.

This implement* was made from a pebble which has been split in two. The upper or flat surface shows the chips with the bulb of percussion by which it was worked. A portion of the rolled surface of the pebble is left untouched, and shows in the cut, proving beyond doubt its intentional and consequently human manufacture. It is impossible that these fractures should have been either natural or accidental. This exhibition of the rolled surface, the crust of the pebble, is a peculiarity belonging chiefly to the valley of the Potomac, where they have been found in considerable numbers. I have ventured to name this the Washington implement, in contradistinction from that other kind which is chipped all over, shows no trace of the crust of the pebble, and which Dr. Abbott once named "Turtle back," but is now by his consent changed to "Trenton implement."

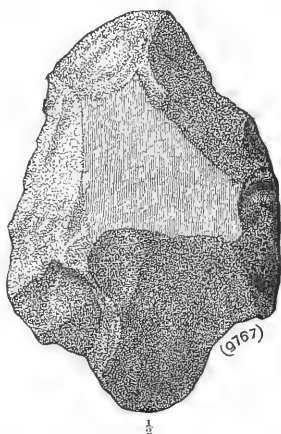
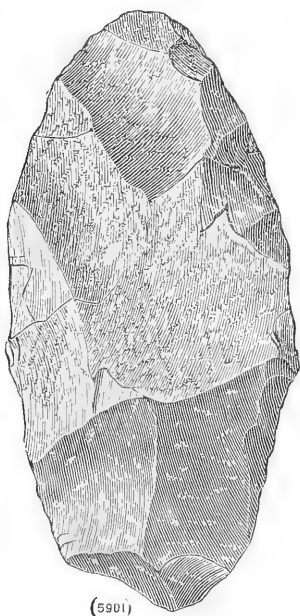


Fig. 5.

YELLOWISH-BROWN QUARTZITE.
(Pamunkey, Charles County, Maryland. Col-
lected by O. N. Bryan.)



(5901)

Fig. 6.

INDURATED CLAY SLATE.
(Pamunkey, Charles County, Maryland. Col-
lected by O. N. Bryan.)



(758)

Fig. 7.

REDDISH QUARTZITE.
(Georgetown, District of Columbia.
Collected by James Webster.)

* See Fig. 5.

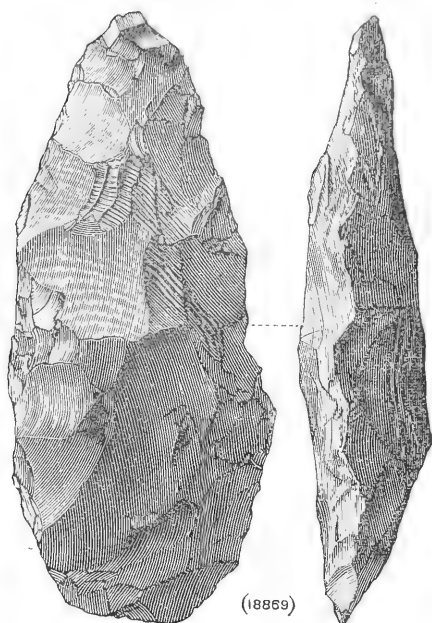
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Fig. 8.

PALE GRAY FLINT, having somewhat the appearance of agatized wood.

(Austin, Texas. J. Van Ostrand.)

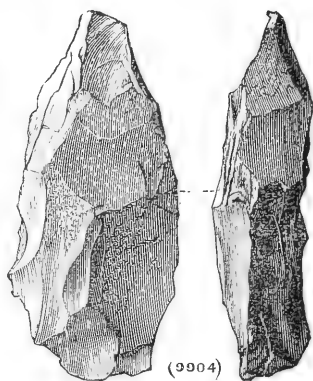
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Fig. 9.

YELLOW CHERT (from a shell heap on the Tennessee River, adjoining and opposite Savannah, Tennessee).

(Collected by J. Parrish Stelle.)
S. I. Report, 1870, p. 414.

These implements* are to be remarked as representatives of a possible new type. They are smaller and thinner than the others, and are

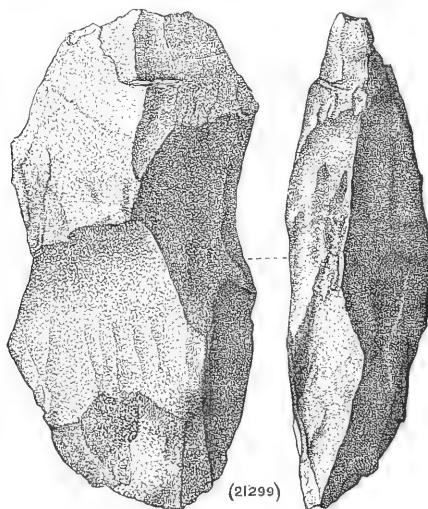
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Fig. 10.

PORPHYRITIC FELSITE.

(Raleigh, North Carolina. Collected by Howard Hayward.)

* See Figs. 6, 7, 8, 9.

found more frequently in the river valleys and on the lowlands, while the others are found more on the bluffs and highlands. They may be found in the neighborhood of mounds and other places of apparent Indian occupation, while the larger kind do not always seem to be.

This implement* corresponds closely in appearance, material, and mode of manufacture to the average paleolithic implement; but there is a remarkable difference in that this is notched on the edges, apparently for the purpose of attaching a handle with a withe or thong, and some of them show traces of such usage by these edges being worn smooth. This feature is unique and has never been found belonging to an undoubted paleolithic implement. The question whether they are paleolithic must therefore be held in abeyance and for further examination. They have been reported principally from the Atlantic slope. The United States National Museum possesses about sixty-five specimens. It has been suggested that these implements have been used as agricultural digging implements, also that they have been used as adzes for the making of canoes and for scooping out soap-stone pots and vessels. If any of these uses should be accepted it would decide *prima facie* that they were not paleolithic.

The following is a résumé of the information and contributions received in response to this circular.

State.	Answers received.	Implements reported.	Number sent.	Original number in Museum.	Total.
Maine	9	196	19	3	218
Vermont	6	70	27	.....	97
Massachusetts	14	79	17	96	393
Connecticut	3	8	.....	19	27
New York	20	530	95	7	632
New Jersey	3	348	2	41	591
Pennsylvania	20	1,000	180	39	1,219
Maryland	4	33	.....	59	92
District of Columbia	8	869	239	298	1,406
Virginia	3	400	26	13	439
North Carolina	2	13	23	5	41
South Carolina	3	.....	.....	.....	.....
Georgia .....	.....	.....	.....	10	10
Florida	1	20	.....	31	51
Alabama	3	1	8	25	34
Texas	1	.....	.....	6	6
Ohio	29	1,215	71	66	1,352
Indiana	13	489	26	26	541
Illinois	17	189	.....	23	212
Kentucky	2	25	.....	15	40
Tennessee	5	48	30	18	96
Michigan	9	224	6	.....	230
Wisconsin	6	21	.....	6	27
Iowa	3	Few	10	2	12
Missouri	7	335	10	5	350
Arkansas	2	86	.....	4	90
California	5	57	.....	38	95
Minnesota	2	.....	.....	48	48

* See Fig. 10.

State.	Answers received.	Implements reported.	Number sent.	Original number in Museum.	Total.
Oregon				7	7
Kansas	5				
Nebraska	1			3	2
Colorado				8	8
Utah	1			25	25
Wyoming				4	4
Arizona	1				
Canada	1	106			106
Total	209	6,762	789	950	8,502

RECAPITULATION.

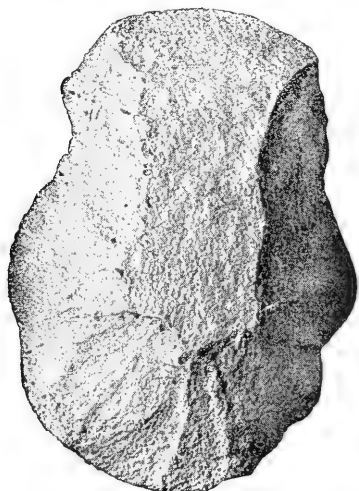
Original number in Museum	950
Number sent	789
Number of implements in Museum	1,739
Total implements reported as in United States	8,502

There is a question yet to be examined, whether certain leaf-shaped implements (see Fig. 15), the same being long, thin, and well-formed chipped points (spear-points), made frequently of the same material, and found associated with the ruder forms just described, may not also belong to the paleolithic period, but not to the same epoch. These may possibly be found to belong to a later epoch which corresponds with the Solutr  en of Europe. This, however, waits further investigation.

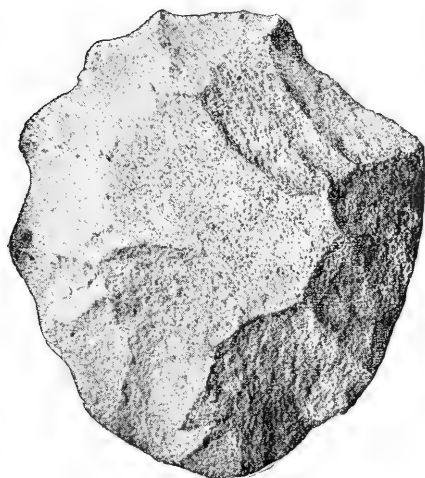
NEOLITHIC IMPLEMENTS IN AMERICA—INDIAN RELICS.

The civilization of the aboriginal occupants of the United States, whether mound-builders, or the red Indian in possession of the country at the time of its discovery has been assigned to the neolithic period. Many copper implements have been found, and were used, but there was never such general use of that metal as to establish what might be called the epoch of copper. Stone does not appear to have been superseded as material for implements. This can not be attributed to scarcity of copper, but rather to its want of favor among the savages. They were about as difficult and tedious to make as were the stone implements, while, when made, they were much softer and more inefficient. Altogether, they do not seem to have possessed sufficient advantages over the stone implement to have displaced it. The principal objects and implements, whether tools, weapons, domestic articles, those for ceremony, gaming, and many for ornamentation, continued to be made of stone. Pottery was, of course, made and used to a great extent. Some domestic articles and many for personal decoration were of bone and shell.

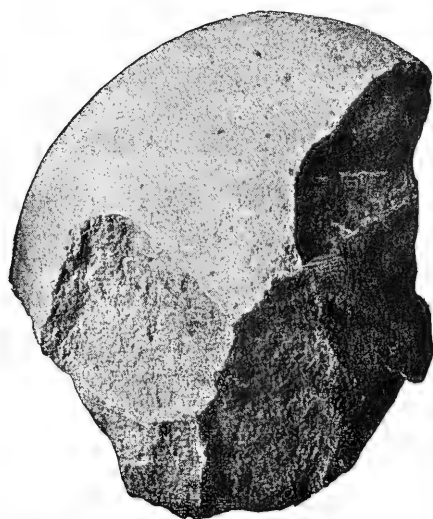
Illustrations of types of these objects taken from the originals in the National Museum will be given in the following pages.



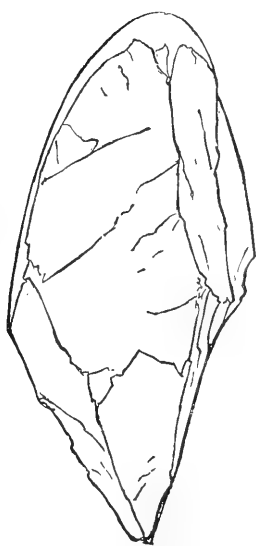
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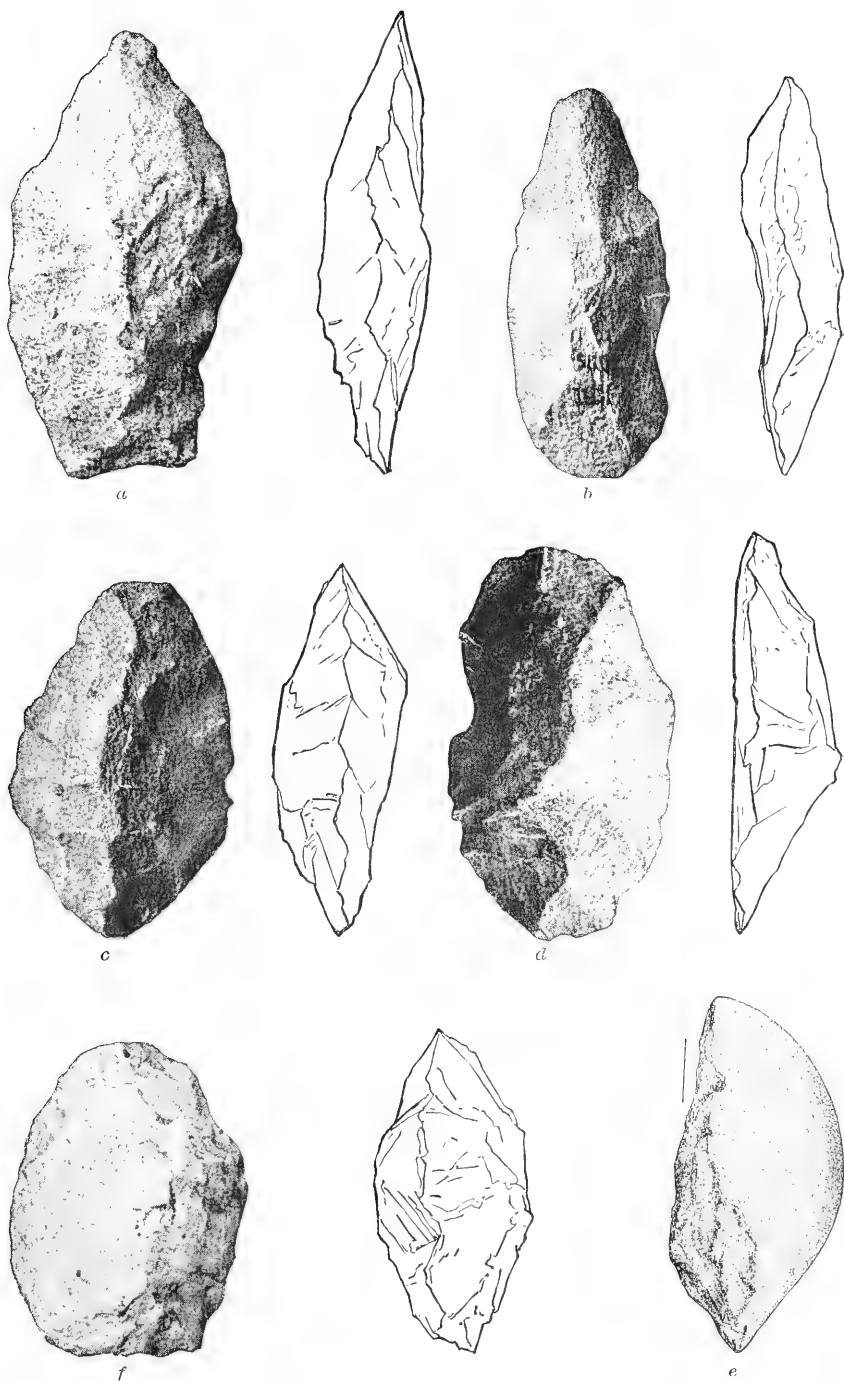
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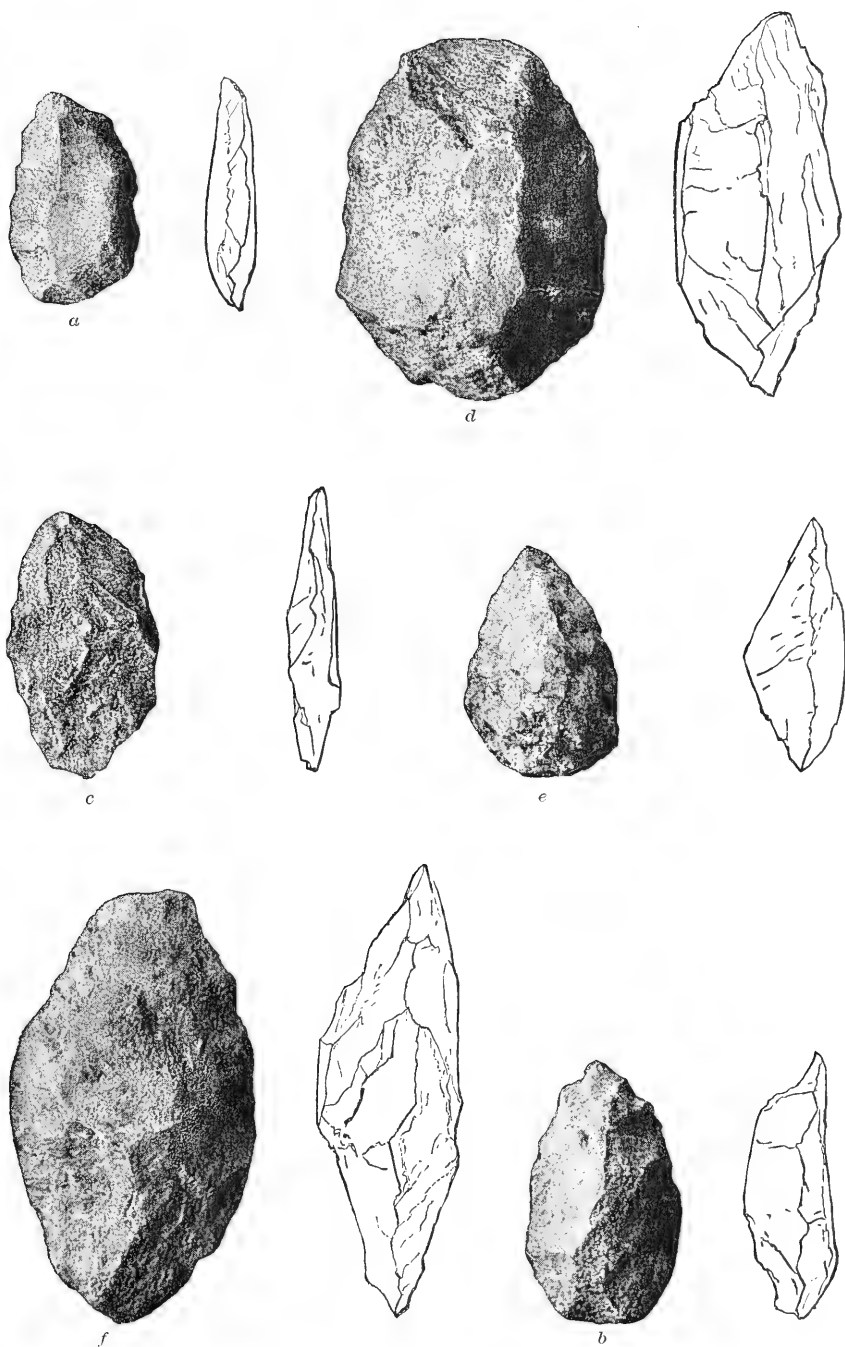
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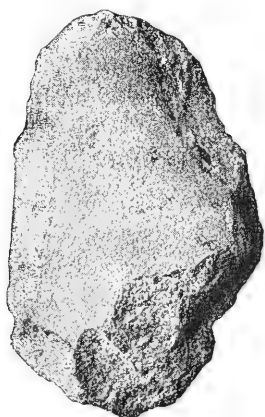




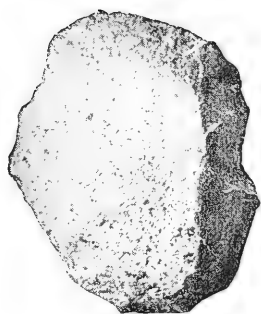
PALEOLITHIC IMPLEMENTS FROM THE DISTRICT OF COLUMBIA. (See page 630.)
(Half natural size.)



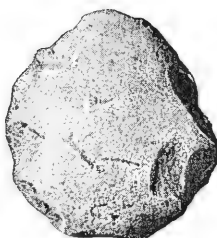
RUDE CHIPPED IMPLEMENTS FROM THE DISTRICT OF COLUMBIA. (See page 630.)
(Half natural size.)



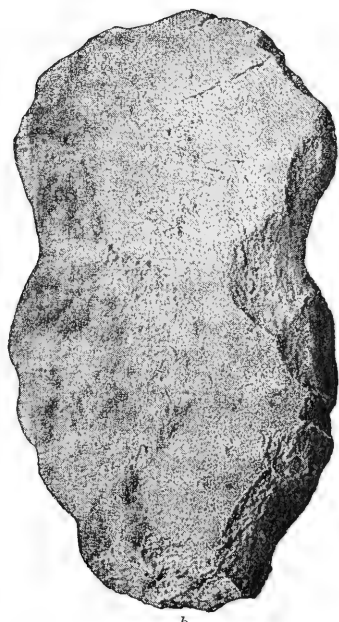
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RUDE CHIPPED IMPLEMENTS FROM THE DISTRICT OF COLUMBIA. (See page 635.)
(Half natural size.)

ARROW OR SPEAR-HEADS, OR KNIVES.

These are of almost every form, material, and size. With but slight differences in these qualities, they are found all over the United States, and are substantially the same as those of the prehistoric ages in all parts of the world. Their various uses, as indicated in the title, are not known with certainty in all cases. Their difference in size

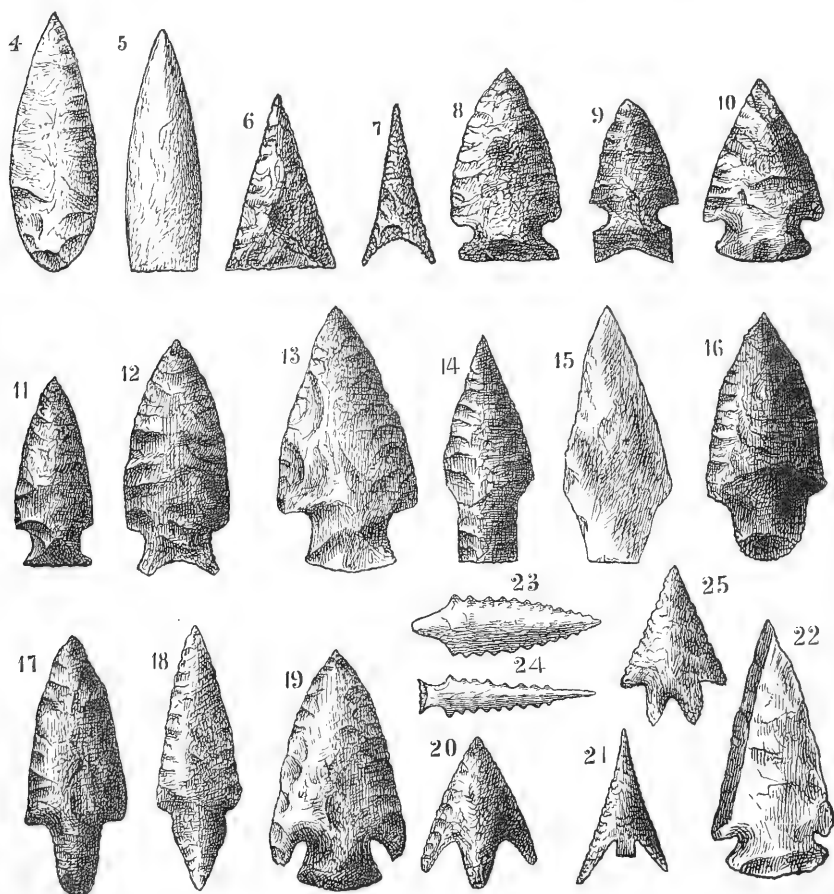

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Fig. 11.

ARROW-HEADS.

Different forms, from various localities in the United States.

seems to have indicated the difference in name. Except for this the same implement might have served as either arrow or spear-head or knife. A tang indicates attachment to a shaft or handle, and this, if found, would determine its purpose. Instances of this attachment occur on the Pacific slope, but in the eastern half of the United States specimens bearing such evidence are practically unknown. They might have been fastened with a cord, or with some adhesive substance.

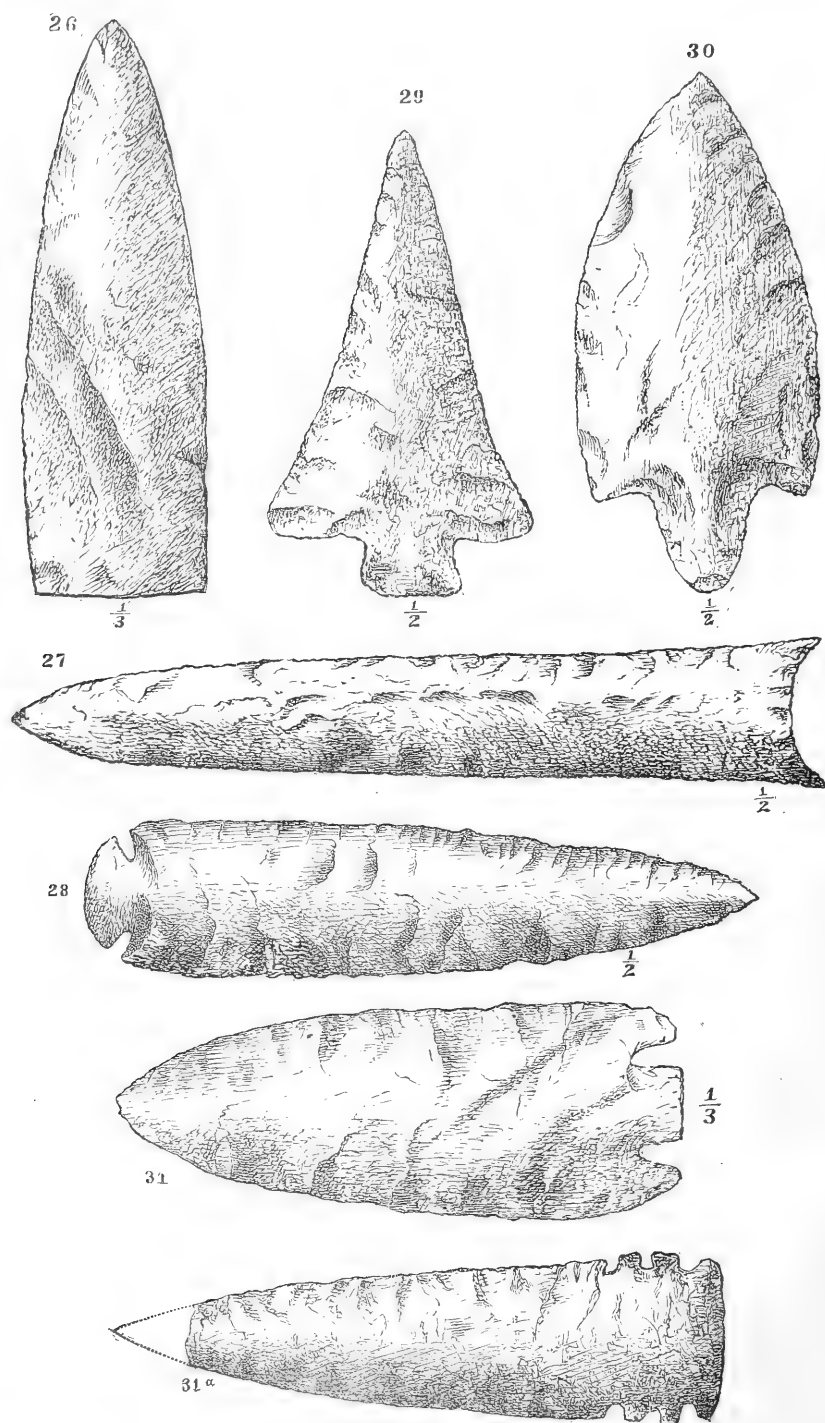


Fig. 12.
SPEAR-HEADS OR KNIVES.

Every finder should examine his specimens carefully for evidences of any sort of attachment, and if found the specimens should be forwarded for examination.

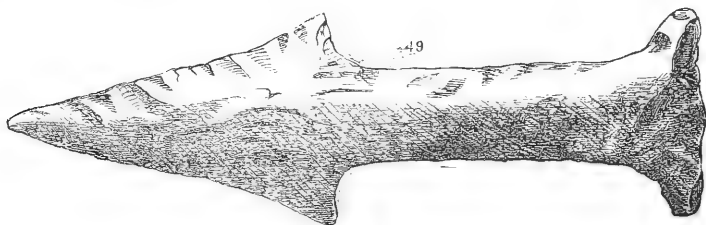


Fig. 13.

CHIPPED DAGGER OF GRAY FLINT.

(Cat. No. 9330, U. S. Nat. Mus. From a mound in Alabama. Collected by N. T. Lupton.)

The Museum possesses one specimen of a knife or dagger with the handle complete, chipped from a single piece of flint somewhat after the fashion of like implements from Scandinavia. It also possesses a dozen or more specimens of knives, principally from California, the handles being short, with the flint blade inserted and fastened with bitumen. In some cases the handle has been preserved, but in others the bitumen alone remains as evidence of the attachment.



Fig. 14.

FLINT KNIFE, attached to short wooden handle by bitumen.

(Cat. No. 14329, U. S. Nat. Mus. Southern Utah. Collected by Maj. J. W. Powell.)

The Museum possesses a specimen which has served as a knife, but without any handle being attached thereto; instead it is wrapped with a strip of otter skin. It is a large specimen, 7 inches long, $2\frac{1}{2}$ wide, and one-half inch thick, and is leaf-shaped. It was collected by Capt. Philip H. Ray, U. S. Army, from the Natano band of Tinneh (?) Indians at Hupa Valley, California. It is of mottled obsidian, which is said to have come from Oregon. Captain Ray relates that these implements were held in great veneration by the old Indians, and that this had been used as a charm or talisman. In writing of the Hupas, Mr. Powers, in his "Tribes of California," says, page 79:

There are other articles paraded and worn in this and other ceremonial dances which they will on no account part with, at least to an American, though they sometimes manufacture them to order for one another. One of these is the flake or knife of obsidian or jasper. I have seen several which were 15 inches or more in length and about $2\frac{1}{2}$ inches wide in the widest part. Pieces as large as these are carried aloft in the hands in the dance, wrapped with skin or cloth to prevent the rough edges from lacerating the hand, but the smaller ones are mounted on wooden handles and glued fast. The large ones can not be purchased at any price, but I procured some about 6 inches long at \$2.50 apiece. These are not properly "knives," but jewelry for sacred purposes, passing current also as money.

LEAF-SHAPED IMPLEMENTS.

These, or similar implements, generally called leaf-shaped, have been found nearly all over the United States, many times deposited intentionally in nests or *caches*, sometimes to the number of a hundred or more, placed on end or on edge, and together as close as they can stand or lie. It is curious to note that in that portion of the United States east of the Rocky Mountains we are practically without information concerning their use or purpose, whether they were used as spear-heads or knives; whether they were objects of ceremony, as mentioned by Powers above, or whether they were intended for practical use. No one knows whether they were used naked in the hand or were attached to a handle. Dr. Metz and Professor Putnam discovered in 1884 in the Mariott Mound, No. 1, Little Miami Valley, ten points of deer antlers, which were grooved or chamfered, so that they might have served as handles for these leaf-shaped implements. But no leaf-shaped implements were found in connection therewith. Of the ten handles one had a piece of bone inserted for a cutting or piercing implement, and another a bit of worked flint, but it was triangular, and had no relation to the leaf-shaped implements, and was to be classed among the arrow-heads of common form.

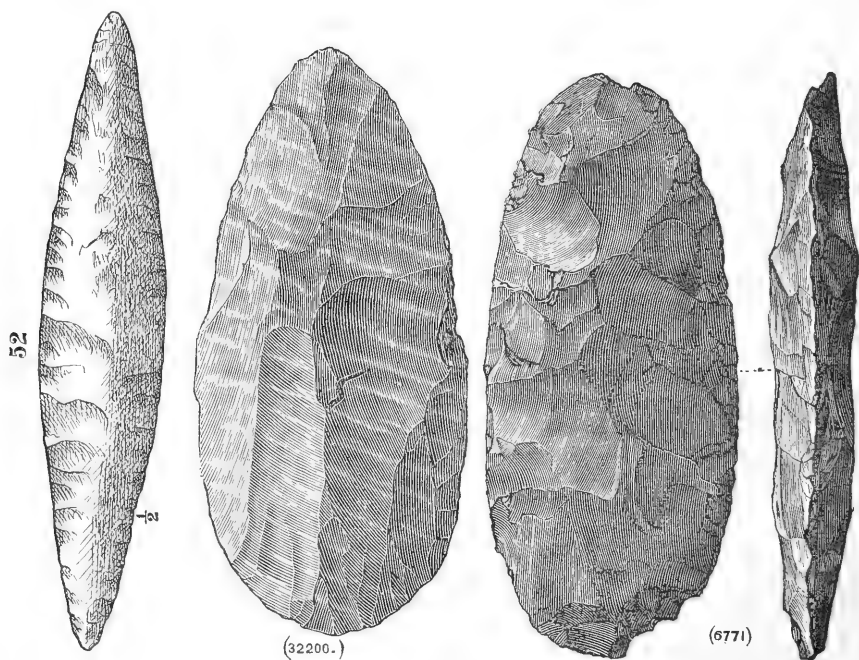
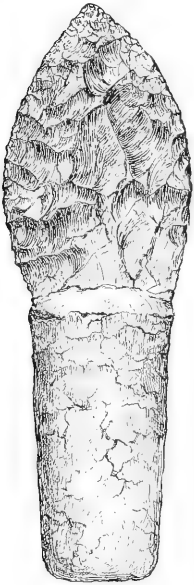


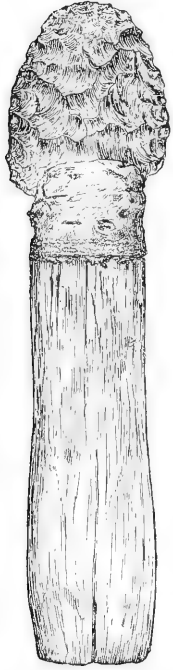
Fig. 15.

LEAF-SHAPED IMPLEMENTS.

These implements are found in plenty on the Pacific slope, but it is remarkable that in only two localities have they ever been found with their use indicated either by attachment to a handle or otherwise.



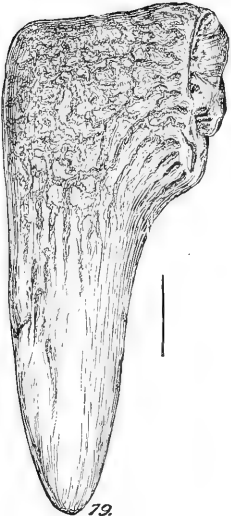
75.



76.



78.



79.



77.

HANDLED KNIVES, FROM HUPA RESERVATION, CALIFORNIA.

FIGS. 75, 76, and 77. Hafted knives, of jasper; wooden handles attached with bitumen. (Cat. Nos. 126527-8-9, U. S. N. M.)

FIG. 78. Obsidian knife; wrapped around one end with a strip of otter skin. (Cat. No. 126530, U. S. N. M.)

FIG. 79. Elk-horn wedge. See Smithsonian Report, 1886, Part I, Ray collection. Plate XVIII.

In the Hupa Valley, northern California, the locality of the implement last described, we have seen it with a strip of otter skin for a handle (Pl. CII, Fig. 78), but others to the number of six or eight were also collected by Captain Ray, which were inserted in a broad wooden handle and fastened with bitumen (Pl. CII, Figs. 75, 76, 77). Some were leaf-shaped and some were with a tang; some were found with handle attached, while others bore the traces of bitumen, but were without a handle. The other locality is southern California in the region and islands about Santa

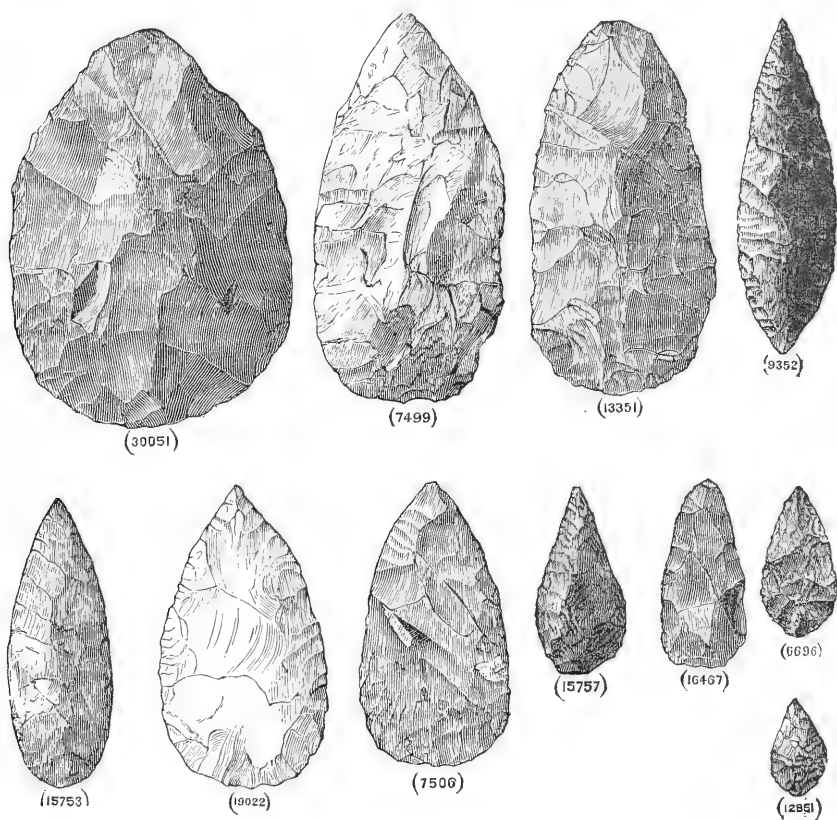

 $\frac{1}{2}$

FIG. 16.

LEAF-SHAPED IMPLEMENTS.

Barbara and the adjacent portions of Mexico. Here they have been found in burial places which appear to be, without doubt, prehistoric. The great archaeological interest of these leaf-shaped implements is that in Europe they belong to the paleolithic period, and are the type of the Solutréen epoch. They have been called in France *feuille de laurier*, laurel leaf. In America but a slight consideration has been given to them. They have always been considered as Indian, and the possibility of their belonging to the paleolithic period has never been contemplated.

It would become intensely interesting if, now that the attention of the public is directed to these implements, they should be found so associated with other paleolithic implements, or with the fauna, or under circumstances which would point to their belonging also to the paleolithic period.

NOTE.—Between the time of the preparation of this paper and the reading of its proof, I have prepared for the Museum, a classification of arrow or spear heads or knives, a short description of which is as follows:

LEAF-SHAPED.

Sub-class A: Thin and finely-shaped implements of the form of a laurel leaf; elliptical and pointed at both ends. They correspond substantially with the French Solutrian type of the paleolithic period of the stone age.

Sub-class B: These may be thicker and ruder than subclass A. Some are more oval, and the bases are not pointed, but are either straight or convex. The class includes the leaf-shaped argillite implements found by Dr. Abbott in the Delaware River gravels of Trenton, N. J.

Sub-class C: These are long, thin blades with nearly straight edges, more like a dagger or poignard. The base may be either convex, straight, or concave. Many of them show traces of attachment to a handle by means of bitumen or gum. They are peculiar to the Pacific Slope.

TRIANGULAR.

This class includes all forms approaching a triangle, whether the bases or edges be convex, straight, or concave. They are without stems, and consequently without shoulders, but in some specimens the concavity of the base produces barbs.

STEMMED.

This class includes all varieties of stems, whether straight, pointed, or expanding, and all varieties of bases and edges, whether convex, straight, or concave.

Sub-class A: Lozenge-shaped.

Sub-class B: Shouldered, but not barbed.

Sub-class C: Shouldered and barbed.

NOTE.—Nearly all of the convex bases are smooth, as though they had been worn. The purpose or cause of this is unknown.

PECULIAR FORMS.

These have such peculiarities as distinguish them from all other classes, but by reason of their restricted number or locality can scarcely form a class of themselves.

Sub-class A: Beveled edges. The bevel is usually in one direction.

Sub-class B: Serrated edges.

Sub-class C: Bifurcated stems.

SCRAPERS.

Thick flakes of flint, obsidian, etc. Worked at one extremity to a convex edge. They were inserted in a handle and used for scraping any needed substance, but principally for dressing skins. Nos. 38 and 41 are from Texas; 39, 40, and 319 from Ohio.

Occasional specimens are found shaped more or less like No. 40, with a tang and barb much resembling in that regard certain arrow or spear

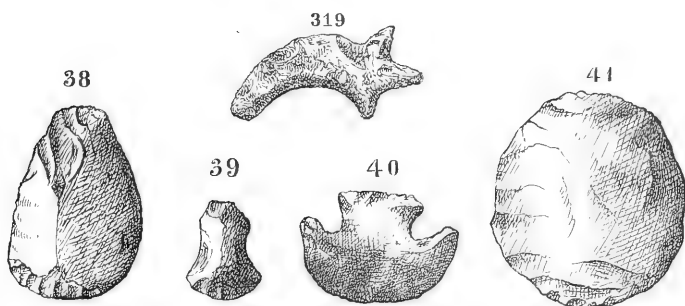


Fig. 17.
SCRAPERS.

heads, from a broken one of which it is supposed they have been made, thus serving a secondary purpose.

PERFORATORS.

They may have served to drill the harder substances, but also softer materials, as wood, hides, bone, etc. But slight traces of usage are found. Their form has given rise to the theory that they were drills or perforators, and they may have been so used, but it is by no means certain, and they may have had another origin or purpose. Old Indians have declared them to have been charms or fetiches.

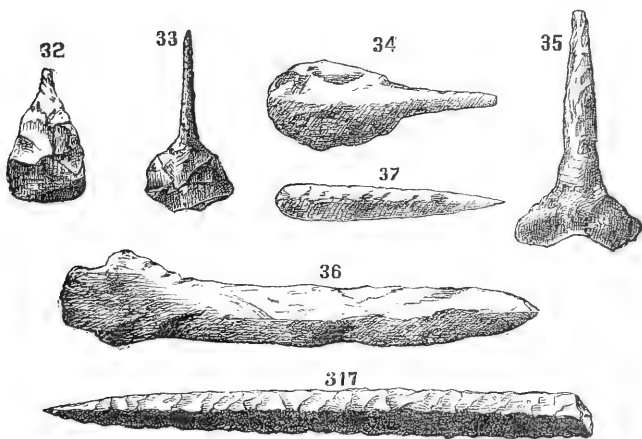


Fig. 18.
PERFORATORS.

Nos. 32, 35 are from Ohio; 33 from Oregon; 34 from Missouri; 36 from Tennessee, and 37 California. No. 7 is triangular, of brown flint from Santa Cruz Island, California.

HOES OR DIGGING TOOLS.

Dr. Rau describes these as "large, flat implements of siliceous material, usually ovoid in shape and sharp around the circumference. They are supposed to have been used as spades or hoes. The lower part is often smoothed by wear, appearing almost glazed." These are probably the largest style of chipped implements belonging to prehistoric times. The Museum possesses specimens 16 inches long, 6 wide, and 1 inch thick. I am not satisfied with the explanation of the smooth or

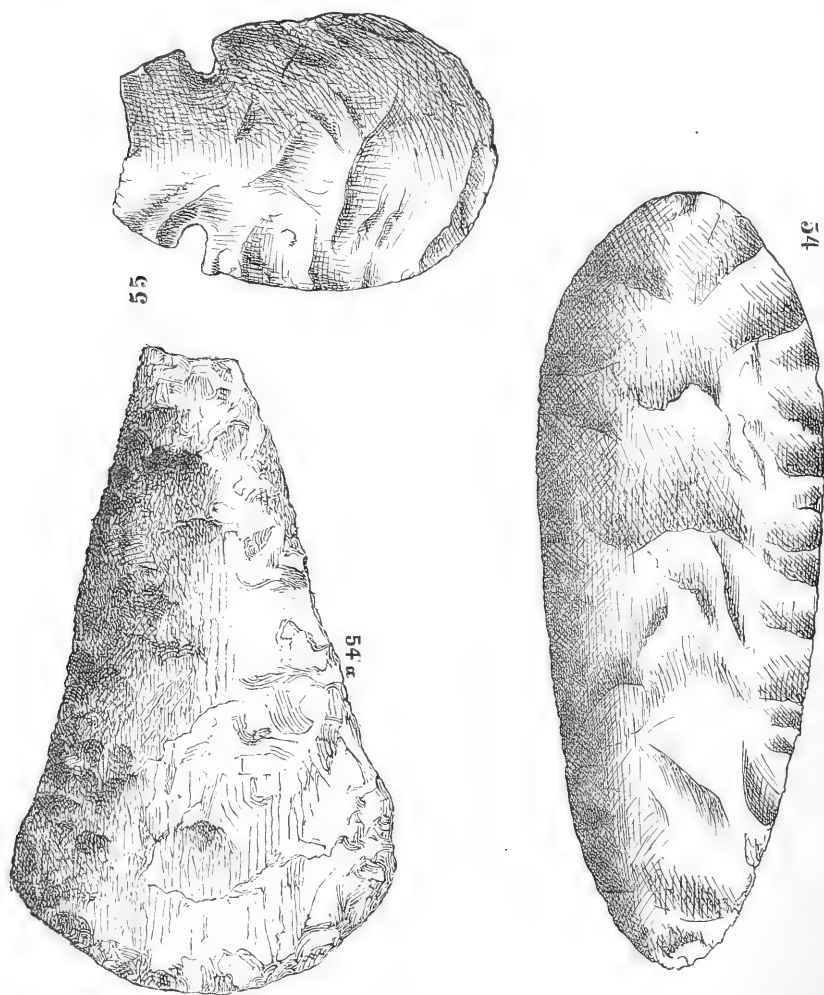


Fig. 19.

HOES, DIGGING TOOLS, OR AGRICULTURAL IMPLEMENTS ($\frac{1}{3}$).

polished appearance at the lower end. They may have been smoothed by use in digging, but many times the polish appears to be indicative of another origin.

No. 54 is from Tennessee; 54a and 55 are from Illinois.

POLISHED STONE HATCHETS.

These are sometimes called celts, from the Latin word *chisel*, but they are not chisels, but chopping tools used as axes or hatchets. The correctness of the Latin word has been assailed, and the name is being gradually abandoned. They have been also called in the United States (I think improperly) *fleshers*. They are the standard implement representing the neolithic period, or polished-stone age. They were often made of flint, but any hard, close-grained, and tough stone in the locality would serve. They are substantially the same in form, size, and, subject to the above suggestion, the same material in all parts of the world. A series of these implements from the United States will not differ essentially from a like series of any other country. They were used as a hatchet, being inserted in a handle of wood; occasionally in a socket of deer-horn, which, in its turn, was inserted in a wooden handle. Specimens made of hematite are, I believe, peculiar to the United States.

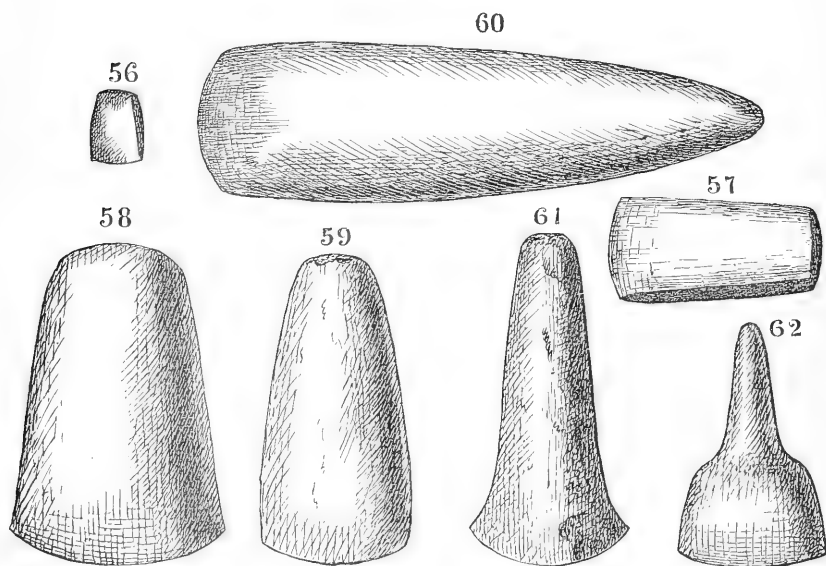


Fig. 20.

POLISHED STONE HATCHETS ($\frac{1}{4}$).

No. 56 represents a hematite hatchet from Ohio; 57, greenstone from Indiana; 58, syenite from Illinois; 59, greenstone, and 60, indurated chlorite slate, from Tennessee; 61 from Louisiana; 62 rare, from North Carolina.

CHISELS, GOUGES, AND ADZES.

The chisels and gouges are similar to the polished stone hatchets just described, except the difference in form indicated by their name.

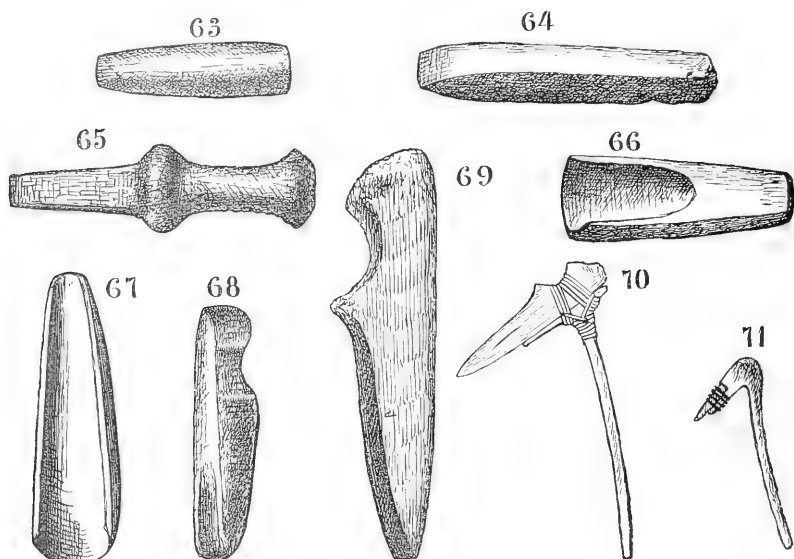


Fig. 21.

CHISELS AND GOUGES (principally from the Atlantic States). ADZES (from the northwest coast).

No. 63, diorite, from Ohio; 64, lydite, from Connecticut; 66, hornstone, from New York; 67, from Pennsylvania; 68, greenstone, from Massachusetts. Of the adzes 69, 70, and 71 are from the northwest coast.

GROOVED AXES, HAMMER-HEADS, AND HAMMER-STONES.

The grooved axes are peculiar to the United States. They are not found at all, or rarely, in European countries. They were used with a handle, which was attached by means of a withe or thong which passed around in the groove. They were of nearly all sizes, from 2 inches in length, weighing 3 or 4 ounces, to one in the Museum from Illinois 13 inches long, $7\frac{1}{2}$ wide, and weighing $20\frac{1}{2}$ pounds. The different styles are shown by the figures. No. 72, greenstone, is from Massachusetts. The average size and weight was from 5 to 7 inches in length and weight $1\frac{1}{2}$ to 2 pounds. No. 73, greenstone, is from Arizona; 74, greenstone, is from South Carolina; 75 is from Wisconsin; 76, greenstone, is from Alaska; 77, graywacke, is from Pennsylvania.

Hammer-stones.—The largest number of these are simply pebbles or broken stones which have been used by holding in the hand. Their broken and battered corners and edges, pecked and roughened by numberless strokes, are the only evidence of their use. Some large and

heavy specimens show a groove, as do the axes, which have served for the attachment of a handle. These are called mauls. No. 78, granite, Colorado, weighs 11 pounds. Many specimens which have been named hammer-stones are flat or oval pebbles, with an intentional worked depression in the center of sometimes one, sometimes both, sides. These implements have been found over a large portion of that world which belonged to prehistoric times. They are supposed to have been used

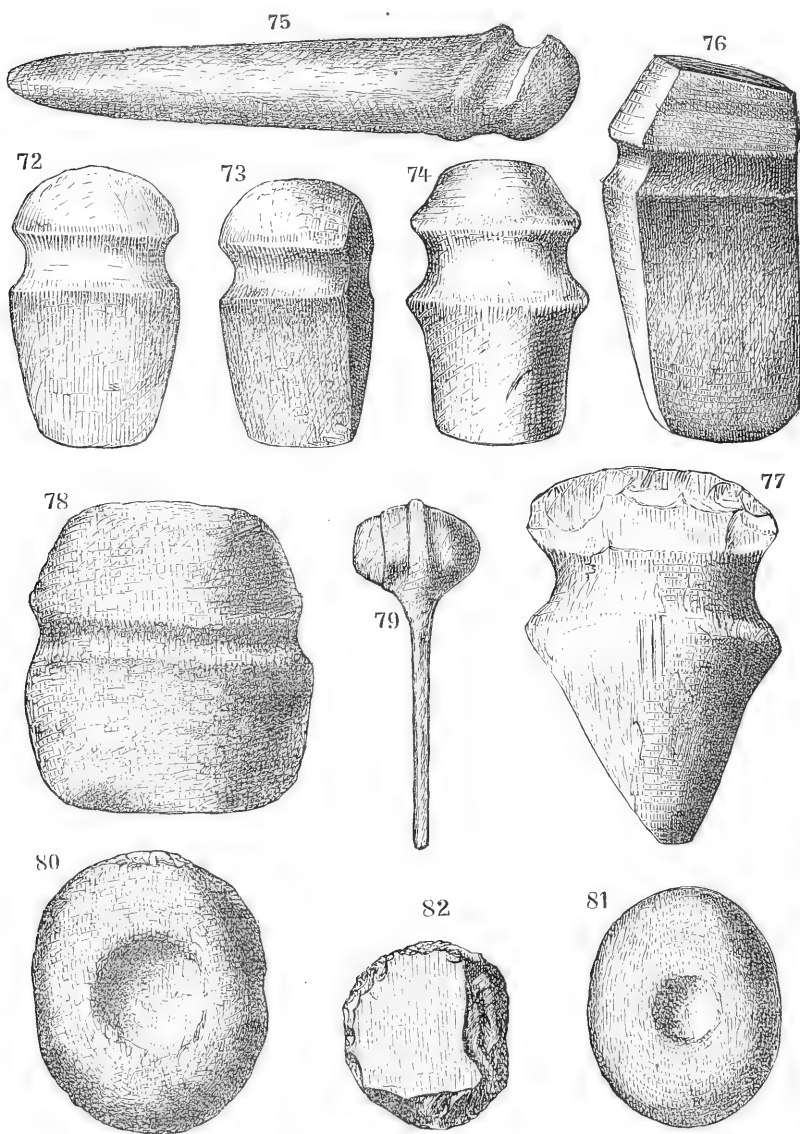


Fig. 22.

GROOVED AXES AND HAMMER STONES. (Nos. 72 to 77, $\frac{1}{2}$ size; Nos. 78, and 80 to 82, $\frac{1}{3}$ size.)

pression in the center of sometimes one, sometimes both, sides. These implements have been found over a large portion of that world which belonged to prehistoric times. They are supposed to have been used

in the mines. This is practically the only grooved implement found in Europe. The Brothers Siret found similar implements in the mines of southeastern Spain. The British Museum has some specimens from the English mines.

No. 79 is a weapon or implement belonging to the modern Indians, a quartzite pebble weighing 2 pounds, incased in rawhide, which continues and is sewed around the withe which forms the handle.

ORNAMENTS, CEREMONIAL AND DECORATIVE OBJECTS, GAMING IMPLEMENTS.

There are a great number of objects widely different in form and material, but which, with all their differences, may be classed together. They have largely passed out of use by the modern Indians, and their

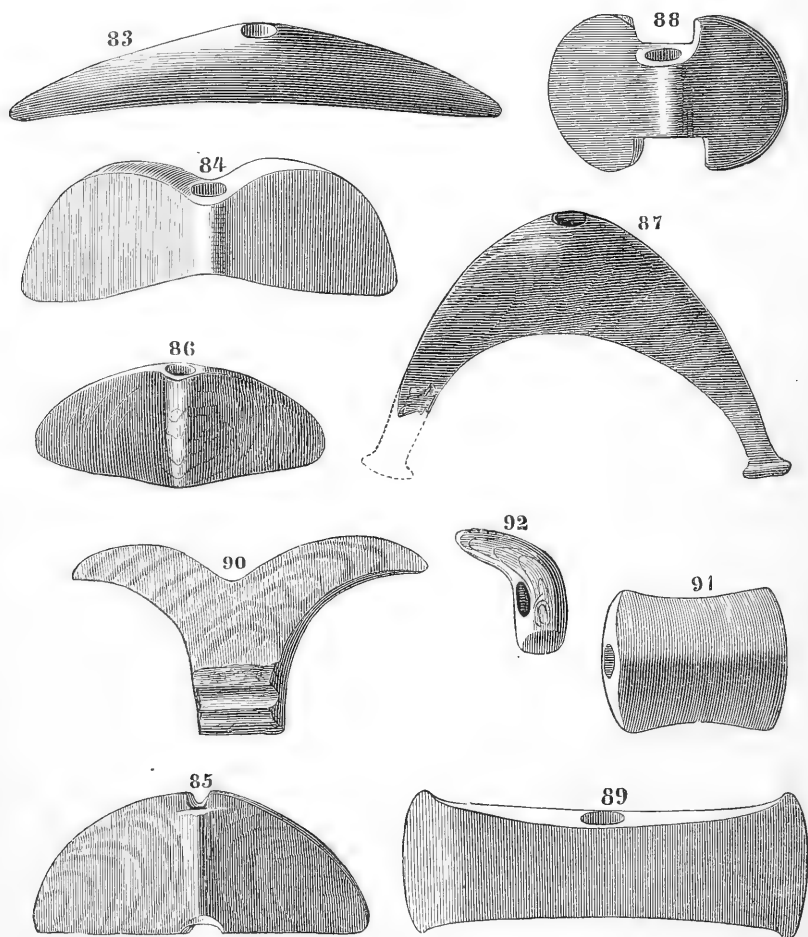


Fig. 23.

BANNER-STONES, OR DRILLED CEREMONIAL WEAPONS ($\frac{1}{3}$).

actual purpose is unknown. Divers names have been given to them, all of which have been based upon a theoretical idea of their purpose or because of their appearance. Some have been called banner-stones, some drilled ceremonial weapons, some pierced tablets, others gorgets, pendants, bird-shaped objects, boat-shaped objects, etc. The names thus given may or may not be correct, but are as good as others that have been suggested in their stead. They should be retained until something more correct can be given. They are all supposed to fall within the category given in the title above.

Banner-stones, or drilled ceremonial weapons.—These are for the most part symmetrically shaped and well polished. Their material is generally a soft kind of stone, principally slate, oftentimes banded. They are all drilled with a small hole. These holes have apparently never been used, for their edges (as well as the corners of the implements) are as fresh and sharp as the day they were made, showing no trace of usage. They have been drilled apparently with a hollow reed, and the annular striæ is frequently to be seen. Many specimens are found partly made, then broken and rejected. These show that they had been shaped approximately before the drilling commenced.

No. 84, of serpentine, is from Pennsylvania; 85, striped slate, from Wisconsin; 86, striped slate, from Indiana; 87, striped slate, from Pennsylvania; 90, striped slate, from Indiana; 92, striped slate, from Indiana; 88, brown jasper, from Louisiana; 91, translucent ferruginous quartz, from Indiana.

Pierced tablets and boat-shaped articles.—These are mostly made of slate, the greenish striped variety having been preferred. The tablets are flat and thin; the holes may be drilled from one side or from both, and are accordingly of a conical or biconical shape. They bear no trace of usage. The same remarks apply to the boat-shaped articles, except as to the difference in shape.

No. 127, slate, from New York; 128, slate, from Pennsylvania; 129, from Louisiana; 130, 131, 132, slate, from Tennessee; 133, potstone, from Pennsylvania; 134, striped slate, from Ohio; 135, greenstone, from Kentucky.

Stone beads, pendants, and other ornaments.—Stone beads are found of different forms and material. No. 200 is serpentine, from Santa Barbara, California; Nos. 201 and 202 are of soapstone, from Pennsylvania; 204, catlinite, from New York; 203 is a straight tube nearly 3 inches in length, from Mississippi, beautifully drilled with a small hole its entire length. It is of a siliceous material resembling yellow jasper. A manufactory of beads of this material was discovered in Lawrence County, Miss., in the spring of 1876, and four hundred and forty-nine specimens were sent to the Museum by Mr. T. J. R. Keenan. An account of this find was given in Smithsonian Report for 1877, pages 293–298.

Another specimen, 211, striped slate, from a mound in Ohio, much larger and longer, not drilled lengthwise, but diagonally across the corners, may have served the same purpose of ornament, as likewise 212, which is of fine-grained argillaceous sandstone, from Kentucky.

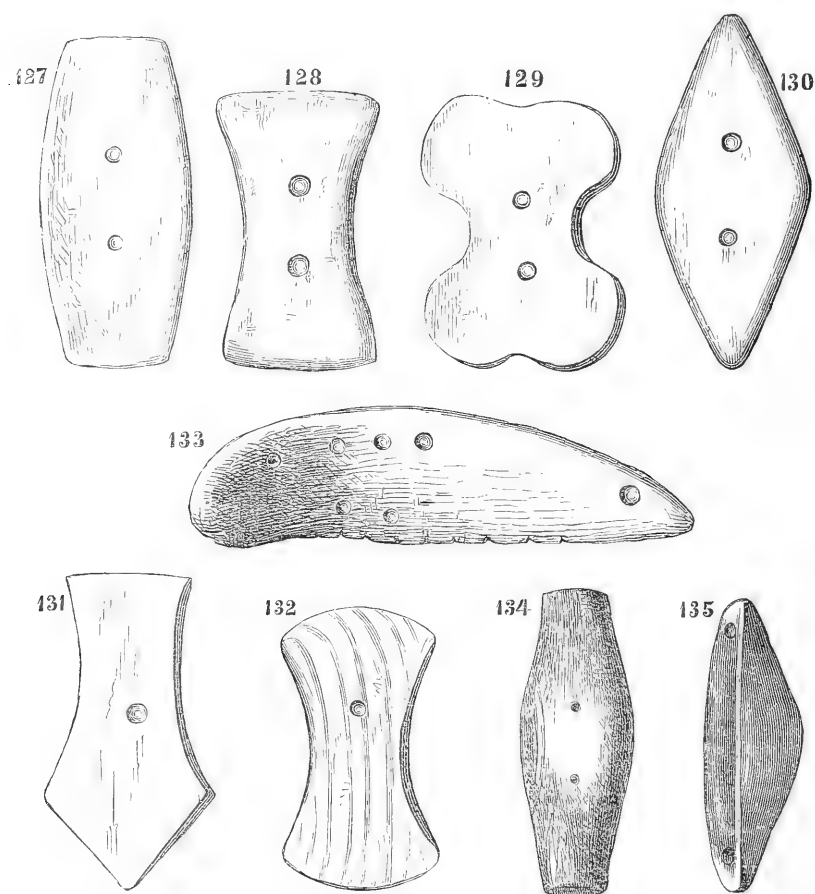


Fig. 24.

PIERCED TABLETS AND BOAT-SHAPED ARTICLES ($\frac{1}{3}$).

Pendants.—No. 205 is of trap rock; 206 a flat sandstone pebble, from Rhode Island; 207, same, from Pennsylvania; 208, same, Virginia; 209, argillaceous slate from a mound in Ohio, where it was found lying near the neck of a skeleton.

Bird-shaped objects.—Though this name has been given to numerous relics from their general resemblance to birds, their shapes are so various as to leave the design often uncertain. Some specimens more resemble the fence-lizard, and the eyes are frequently indicated by small, round protuberances. The objects are generally of soft stone, such as

the favorite green-striped slate; yet sometimes syenite and other hard substances have been employed.

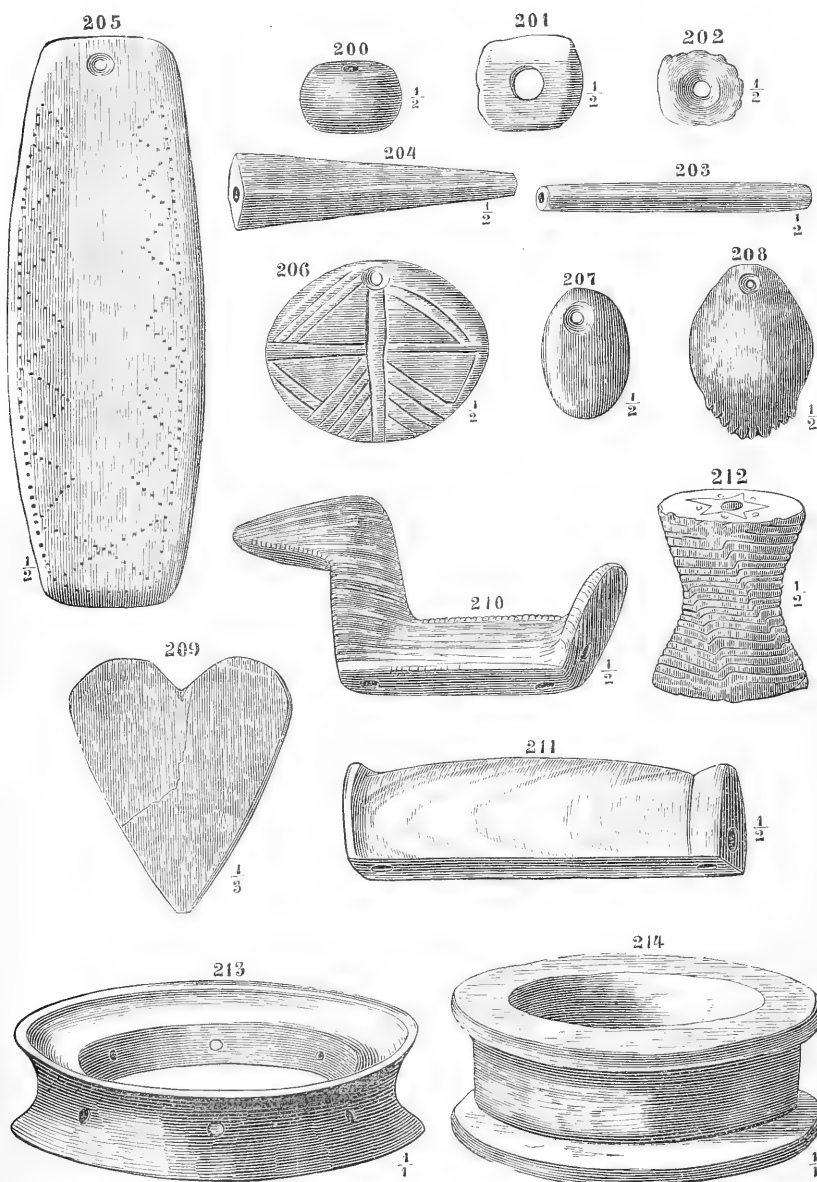


Fig. 25.

STONE BEADS, PENDANTS, AND OTHER ORNAMENTS.

No. 210 is striped slate from Pennsylvania. Small holes are drilled from the bottom and end, respectively, diagonally so as to meet and

form a continuous hole. The purpose of these have been for a long period unknown. A Chippewa Indian told me, in the Smithsonian Institution, last summer, that they served for gaming. They were placed in a pan or basket, which, being covered, was shaken and then set down quietly, the cover removed, and an inspection would show how many of the birds were seated upright. The player having the greatest number thus won the game.

Plummets and sinkers (Fig. 26).—These are analogous in name, and possibly sometimes in appearance, to the pendants just described; but an examination of the real object in the number as possessed by the Museum shows such differences as that they can not be classed together. Taking the last numbers on Fig. 26 for first description, Nos. 111 and 113 are of quartzite, from Pennsylvania; 112 is of graywacke, from New York. They are simply flat pebbles with notches chipped out on opposite sides to receive a cord or thong. Another variety, but of the same class, are pebbles more nearly round, which are still in their natural state, but have been grooved around the circumference. No. 104 is greenstone, from California; 107, granite, from Rhode Island; 108, soapstone, from Georgia; one with two grooves at right angles is 109, talcose slate, from Rhode Island; while No. 110 is sandstone, from Oregon, and is decorated with engraved lines. The latter may have served as an ornament. These specimens show a substantially different purpose from the gorgets or pendants (No. 205 *et seq.*), and it is alleged were used as plummets or sinkers, but on that opinions differ. No. 107 may possibly have been used with a handle and served as a weapon. The others, Nos. 100 to 105, are totally different from the pendants, and have been manufactured into their present state. They are of hard material, red or brown hematite, jasper quartz, greenstone, etc., and are made with grooves, knobs, or holes, apparently all for suspension. Their form would indicate them to be plummets. They much resemble the modern plummet, but their actual use is unknown. No. 100 is hornblende, from Ohio; 101, hematite, from Tennessee; 102 is from Arkansas; 103, greenstone, from Ohio; 105 is quartzite from Massachusetts; 106, greenstone, from Massachusetts. This class are supposed to have served as sinkers for the nets of prehistoric fishermen, but nothing more is known with certainty than is indicated by their appearance.

Discoidal stones (Fig. 27).—These are supposed to have been used for games among the Indians, probably in playing the game called “chung-kee.” It resembles the modern game of quoits, except that the stones are rolled on the ground instead of being pitched through the air. Some of these discoidal stones measure 6 inches and more in diameter with a regular dish-shaped cavity on each side. Their material is always hard and is often ferruginous quartz. They are carefully made, evidently with great labor; their outline is regular and true, and they have been rubbed and polished smooth.

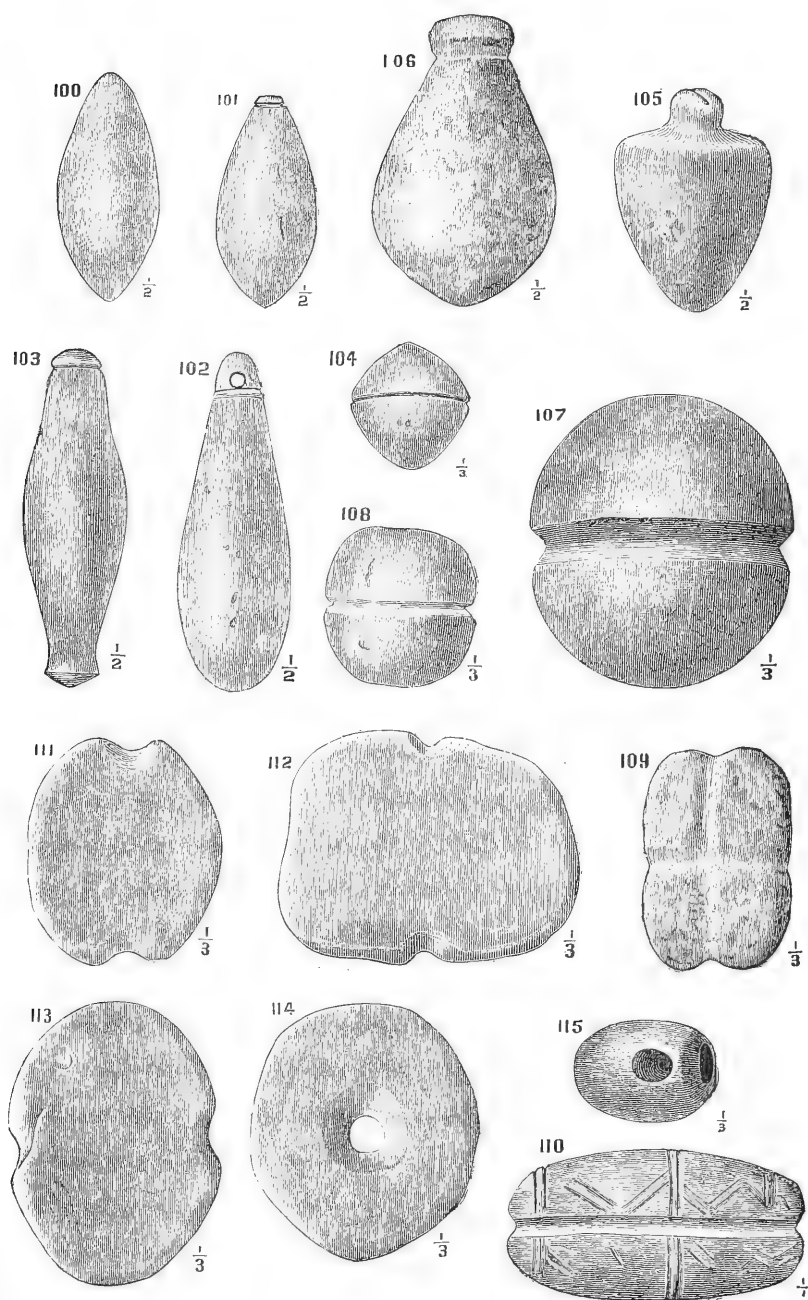


Fig. 26.

PLUMNETS AND SINKERS.

No. 116 is yellow-brown ferruginous quartz, from Tennessee; 117, brown ferruginous quartz, from Tennessee; 118, dark greenstone, from a mound in Illinois. In some specimens the cavities on the sides are carried deeper than in others, and their center marked by a perforation. Nos. 119 and 120 are quartzite, from Ohio. Other specimens are without the dish-like cavity. No. 121 is quartzite, from Georgia. Some specimens, similar in every other appearance, are diminutive, scarcely more than an inch in diameter. No. 122 is argillite, from Pennsylvania; and curious to remark, relics presenting the same appearance have been made of broken clay vessels, which, except the hole, resemble the spindlewhorl. The writer found a specimen of this kind in a prehistoric workshop in Brittany, France. It has been suggested that they were used as paint cups, and possibly this may be true.

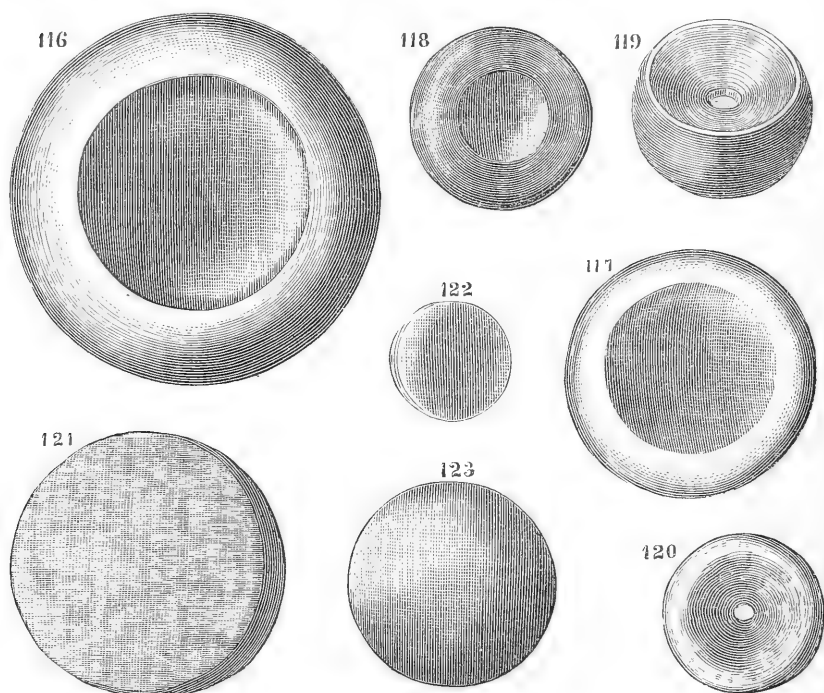


Fig. 27.
DISCOIDAL STONES ($\frac{1}{3}$).

When in Italy I remarked a game which had a great similarity to the chungkee of the Indians. In 1889 I wrote to my friend, R. Mancini, for a description, which he gave in the following :

LETTER FROM R. MANCINI, ORVIETO, ITALY, TO MR. WILSON.

* * * * *

The play, made by rolling discs at a mark, which you saw in one of the streets outside the city of Orvieto, has several names. It is called Ruzzola, or Ruzzoletta when played by the children with small discs; but if the play be by adults and with large discs it is called Ruzzolone, or sometimes Giuoco del Formaggio, or Play of the Cheese, because when played by the peasants or shepherds they use their discs of

cheese, betting one cheese against another. It is usually played by two persons, but may be by four. They divide themselves into opposite parties, and each one alternately throws the cheese or the disc, rolling it on its periphery at the distant mark or peg.

The discs are generally of hard wood. Sometimes the children, for economy, make them of terra-cotta, and also sometimes, but rarely, of stone. The small discs are from 7 to 12 centimeters in diameter, while the large ones are from 18 to 20 centimeters.

The following are the principal rules of the game:

Choice is made by "odd and even" as to which party shall have the first play. The line or point of departure is fixed by consent, and here the player stands to roll his disc. The goal or mark for its arrival is also fixed, and he whose discs rest nearest the mark or line is declared the victor.

This play dates from high antiquity, and is believed to be the modern repetition of the ancient classic game made known generally by the antique statue of Discobolus.

In excavating the ancient tombs I have found terra-cotta discs placed as covers for amphora in crematory burials, but which appeared to have been first used as discobolus.

Perforated stones—club-heads or riatta.—The discoidal stones of the perforated kind pass by degrees into the ring form, a type exemplified

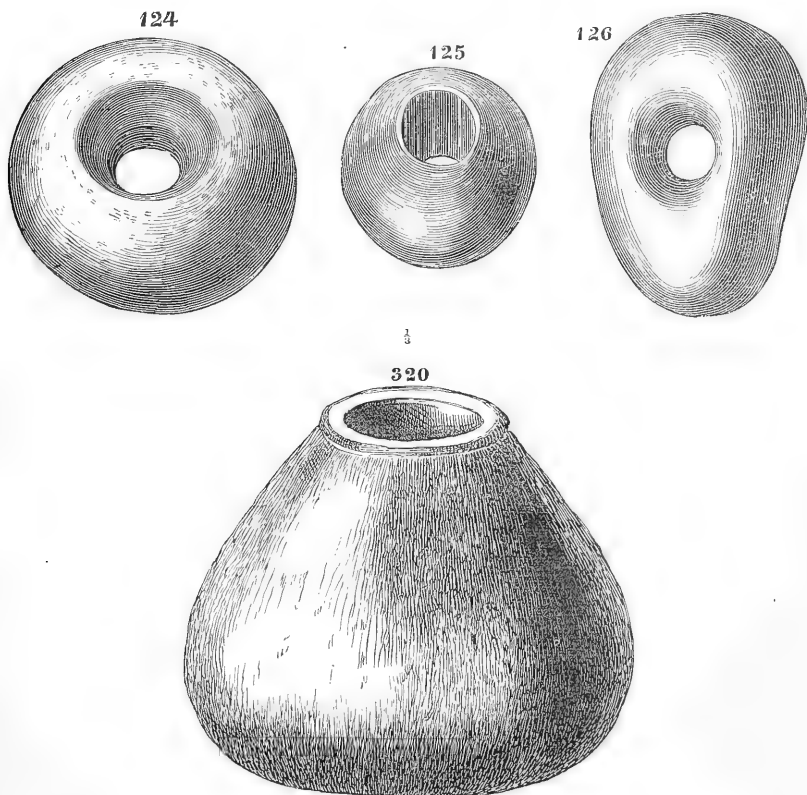


Fig. 28.

PERFORATED STONES—CLUB HEADS OR RIATTA.

by a large number of specimens from southern California. Their material is sandstone, serpentine, soapstone, etc., though occasional specimens have appeared of a harder material like greenstone. They vary much in size and character. They are from $1\frac{1}{2}$ inches in diameter to 5 inches and more. Some are only half an inch in thickness, while others are so thick as to equal their diameter, almost forming a globe. Some are pear-shaped; others, with the globular form like No. 125, have their holes drilled the same size all through. They are occasionally decorated, and may have served as heads for a club or staff. Specimens with a staff 5 feet long have been found in California and Mexico, and also in New Zealand.

No. 124 is hornblende, from Santa Catalina Island; 125 greenstone, and 126 serpentine, from Santa Rosa Island, California.

Evidences of usage are to be seen in specimens resembling 124, 126, and similar objects are used in Mexico called riattas. A lariat is passed through the hole in the stone and stretched, and is polished and smoothed by the stone rubbing back and forth.

CUTTING-TOOLS, SCRAPER AND SPADE-LIKE IMPLEMENTS.

Cutting tools.—No. 93 is of black slate, from Pennsylvania; 94, hard red shale, from Pennsylvania; 95, from Indiana. Implements similar to these are used on the northwest coast for opening fish. (Fig. 29.)

Scraper and spade-like implements.—These have been classed as axes, but an examination shows them more likely to have served as scrapers or spades. They are of large size, hard material, and scarcely enough examples have been found to establish them as a class. They are possibly abnormal specimens. No. 96 is greenstone, from Kentucky; 97, from Arkansas; 98 and 99, from South Carolina.

STONE VESSELS FOR CARRYING OR HOLDING LIQUIDS—COOKING AND GRINDING UTENSILS.

Vessels like a pot or platter were made and used by the aborigines. East of the Rocky Mountains they were made of soapstone; while on the western side the material used was much harder. Soapstone quarries have been found in many parts of the United States where these utensils had been manufactured by the prehistoric man. Uncompleted vessels and those in fragments are frequently found. They were many times made of a size and depth sufficient to hold, and if need be cook, liquids. (Figs. 30, 31, 32, 33.)

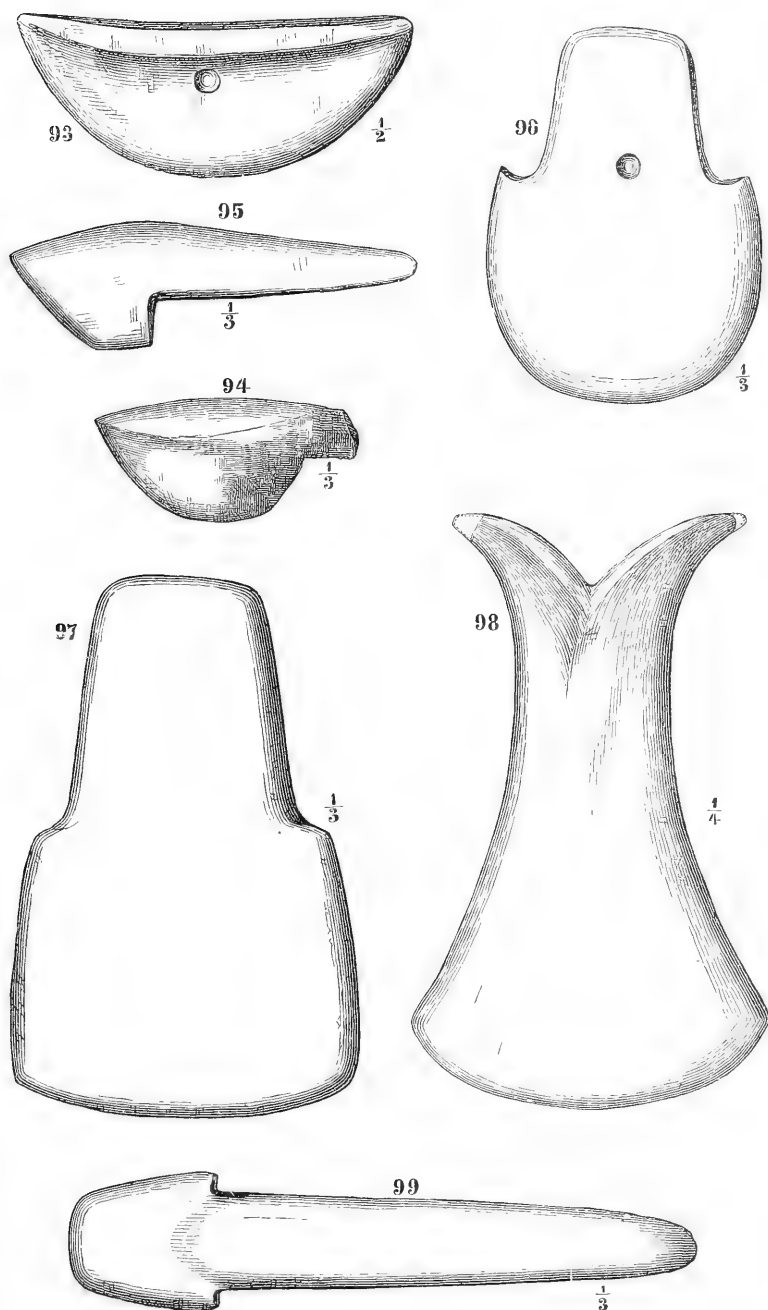


Fig. 29.

CUTTING TOOLS, SCRAPER, AND SPADE-LIKE IMPLEMENTS.

Others were in the shape of plates, and as such could be used to fry and broil.

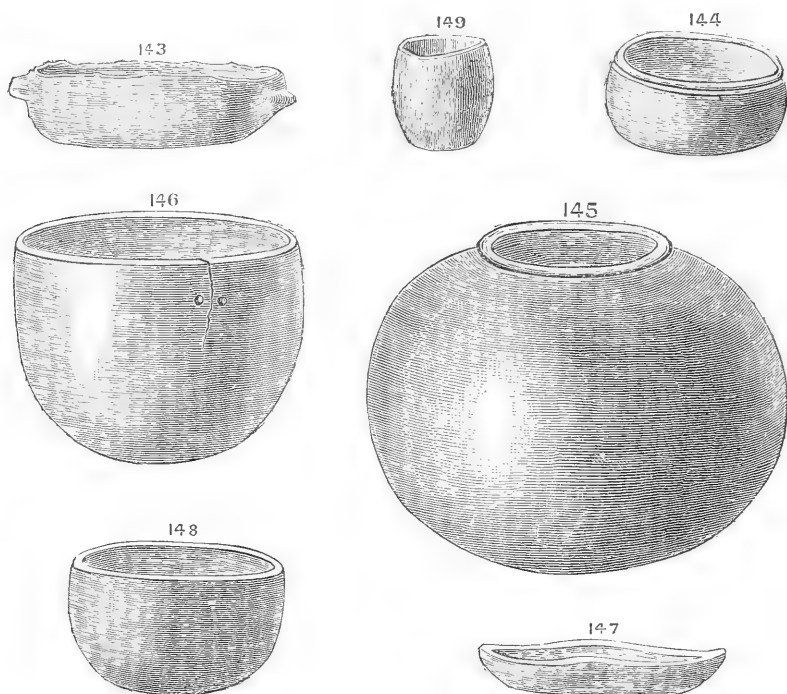


Fig. 30.
STONE VESSELS (1).

Nos. 150 and 151 are of graywacke from a mound in Alabama; 152 is of soapstone, from Santa Cruz Island, California.

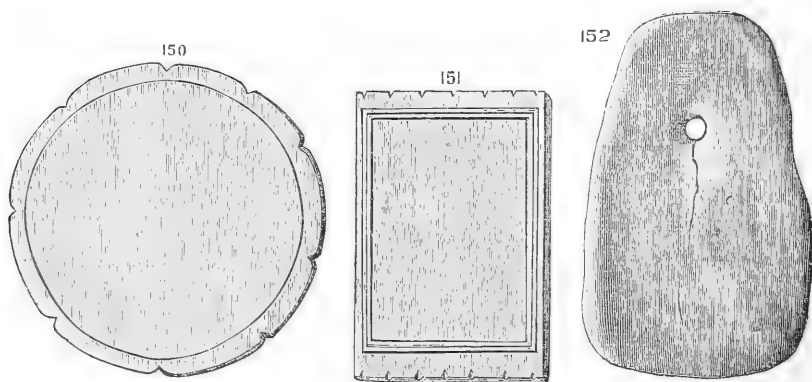


Fig. 31.
STONE PLATES OR PLATTERS (1).

Mortars are of varying dimensions and shapes. The best specimens come from California. Nos. 153, 154, and 155 are all from San Nicolas Island, California; 156, Dos Pueblos, and 157, from Santa Cruz Island, California. Nos. 158 and 159 are stone slabs used for grinding (the process being indicated in the figure) after the fashion of the Mexican Indian metate. They are from Utah and New Mexico.

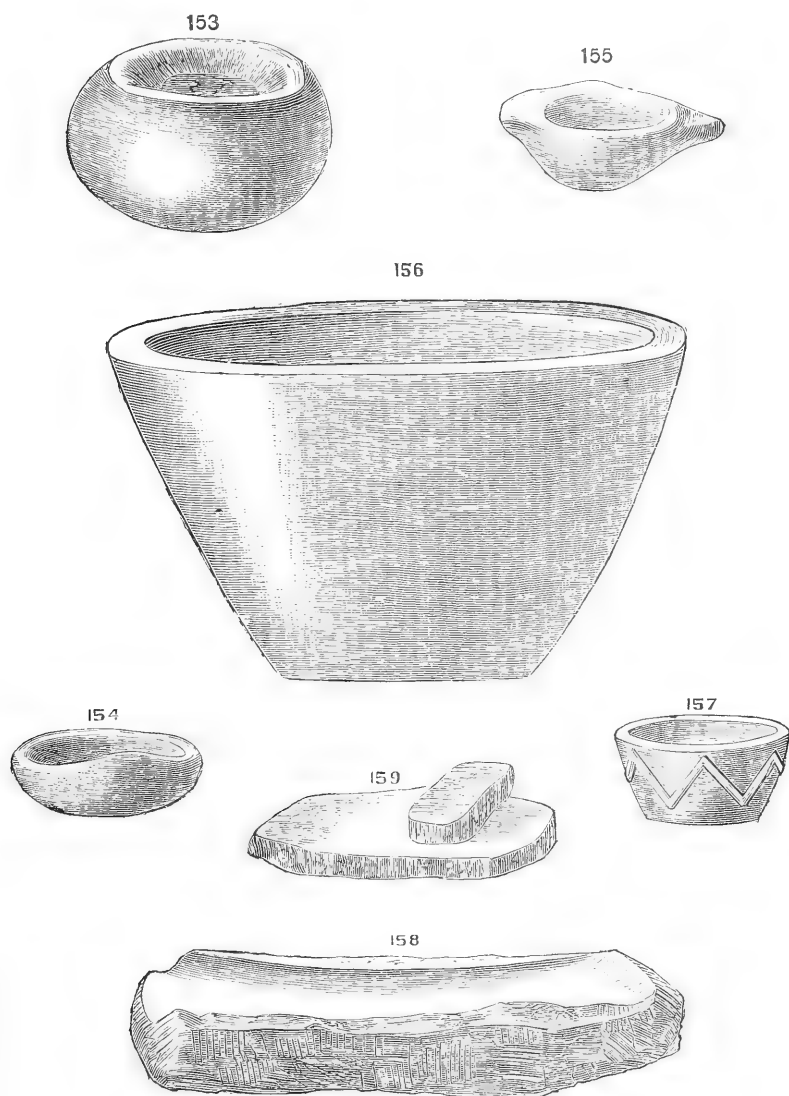


Fig. 32.
MORTARS.

A mortar without a pestle would be of but slight use. Many specimens are found. While the greater proportion of those in the Museum

come from the Pacific coast, yet the Eastern States are by no means unrepresented.

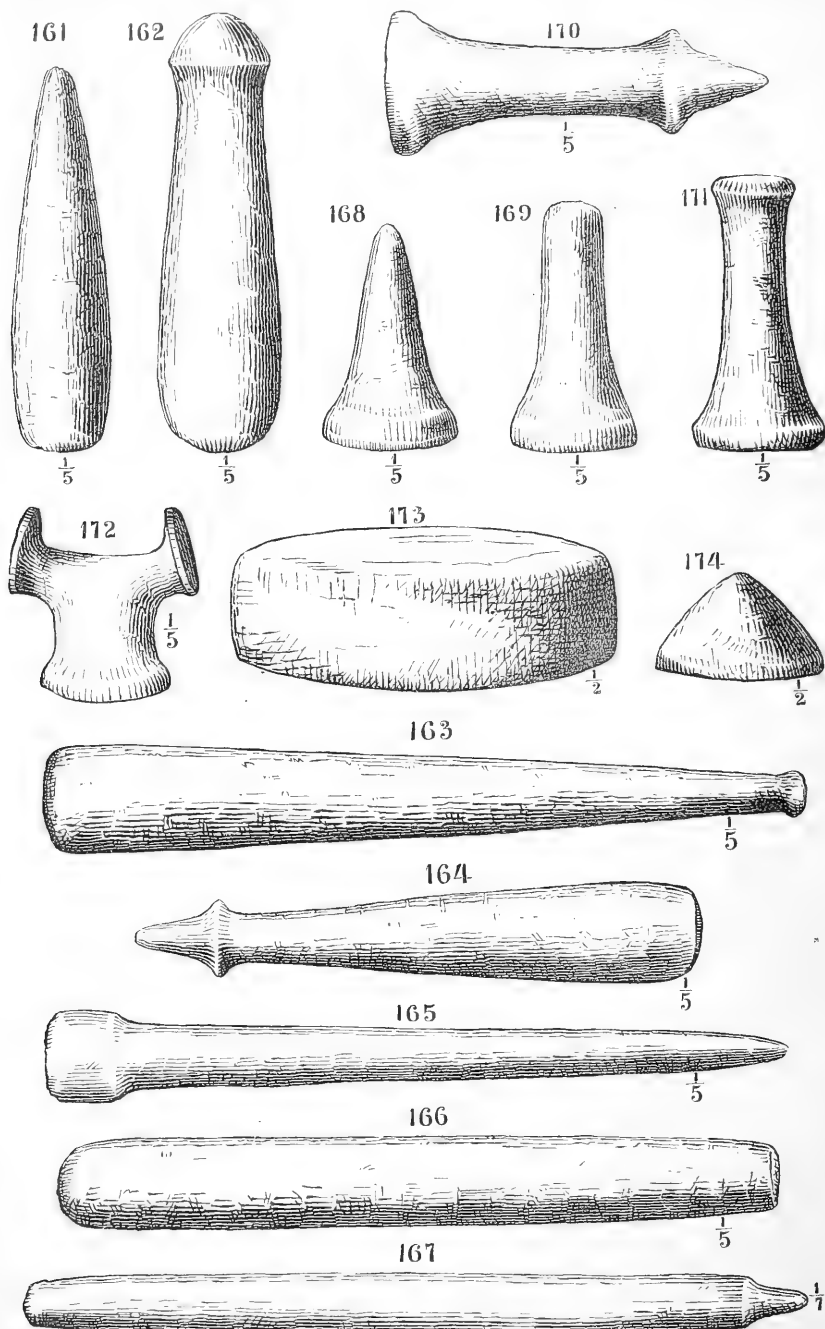


Fig. 33.

PESTLES AND HAMMERS (principally from California).

No. 161 is of syenite; 162, 163, 164, 165 are from California; 166 is fine-grained sandstone, from Rhode Island; 168, greenstone, from Pennsylvania; 169, syenite, from Ohio; 167 is from Alaska, 2 feet 5 inches long, of greenstone. Nos. 171 and 172, from the Pacific coast, are labeled as hammers with which to drive wedges to split wood. Dr. Rau says:

There is a class of small conoid-shaped mullers made of hematite, which may have been used for rubbing paints (No. 174, greenstone, Ohio).

ROCK SCULPTURES OR PICTOGRAPHS.

These represent sometimes human, sometimes animal, forms, and sometimes forms which can not be identified. They may have been made by scratching, pecking, or cutting. Occasionally they are colored. The figures are often large and complicated, and could only have been produced by long-continued labor, which, from their position (many times on naked rocks, high up on a precipice), was not unaccompanied by danger. Their position should be noted by the observer; when possible, sketches should be made and the discovery reported to the Smithsonian Institution.

Cup-stones. These are small cavities wrought by pecking in the surface, sometimes of the solid rock, and again in boulders and pebbles.

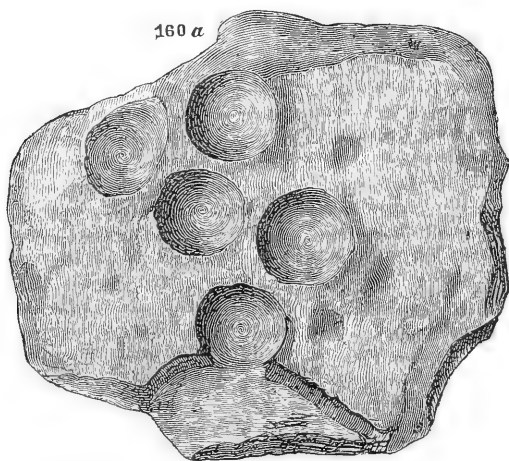


Fig. 34.
CUP-STONE.

They, like the rock-sculpturing, are distributed almost over the entire globe, and have been found in regular lines or diagrams high up on the face of the rocks in the Himalaya Mountains. They have been found on large boulders among the Alps and all over Europe; also on the stones composing the megalithic monuments of prehistoric man, where the cavities are often polished smooth. They are numerous in Scotland and England on pebbles or small boulders, and equally so in

the United States. They are found in abundance in Ohio. Their use or purpose is entirely unknown. The subject forms an interesting study. Dr. Rau published an interesting monograph thereon, entitled, "Observations on Cup-shaped and other Lapidarian Sculptures," contributions to North American Ethnology, vol. v, etc. He inclines to give them a religious rather than a utilitarian character.

PIPES AND SMOKING TUBES.

No class of aboriginal productions of art exhibit a greater diversity of form than do the pipes of the prehistoric man of North America.

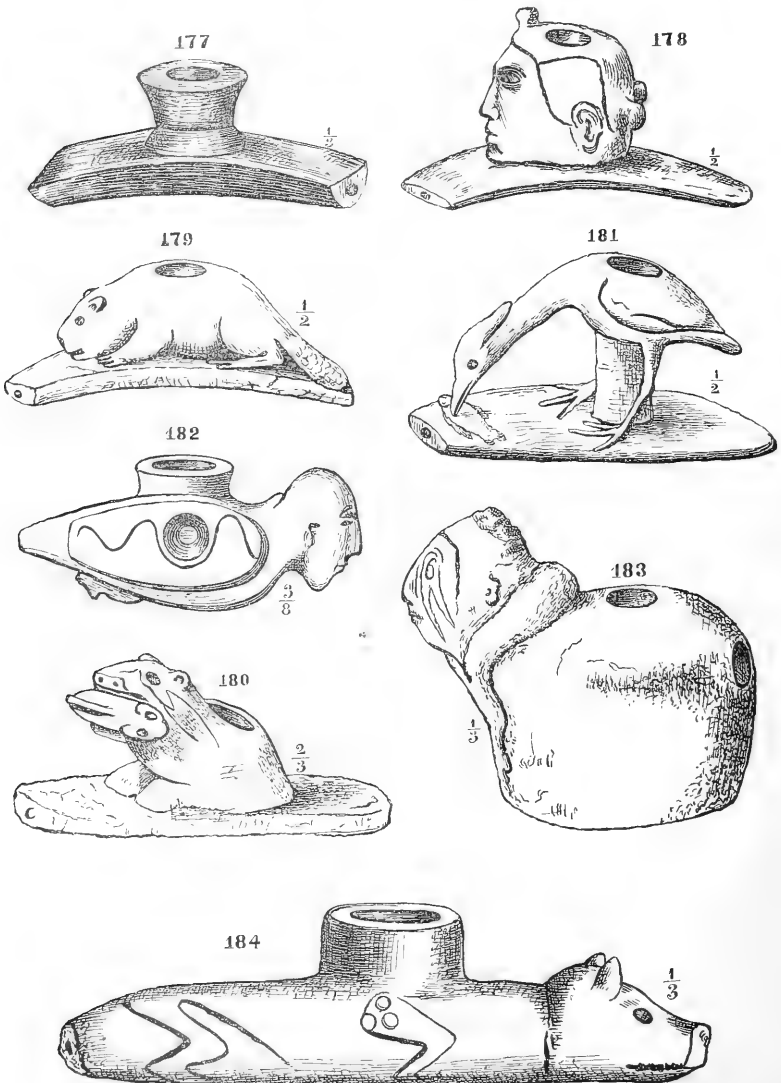


Fig. 35.
STONE PIPES.

They are chiefly carved from stone, but not unfrequently were molded in clay.

Messrs. Squier and Davis, in their explorations of mounds in Ohio, discovered many curious and interesting types. They were supposed at one time to have been made of hard stone, a kind of porphyry, but later examinations and scientific analyses have shown them to be of softer materials, composed of slaty and calcareous minerals.

Nos. 177 to 184 represent types of those found by Squier and Davis.

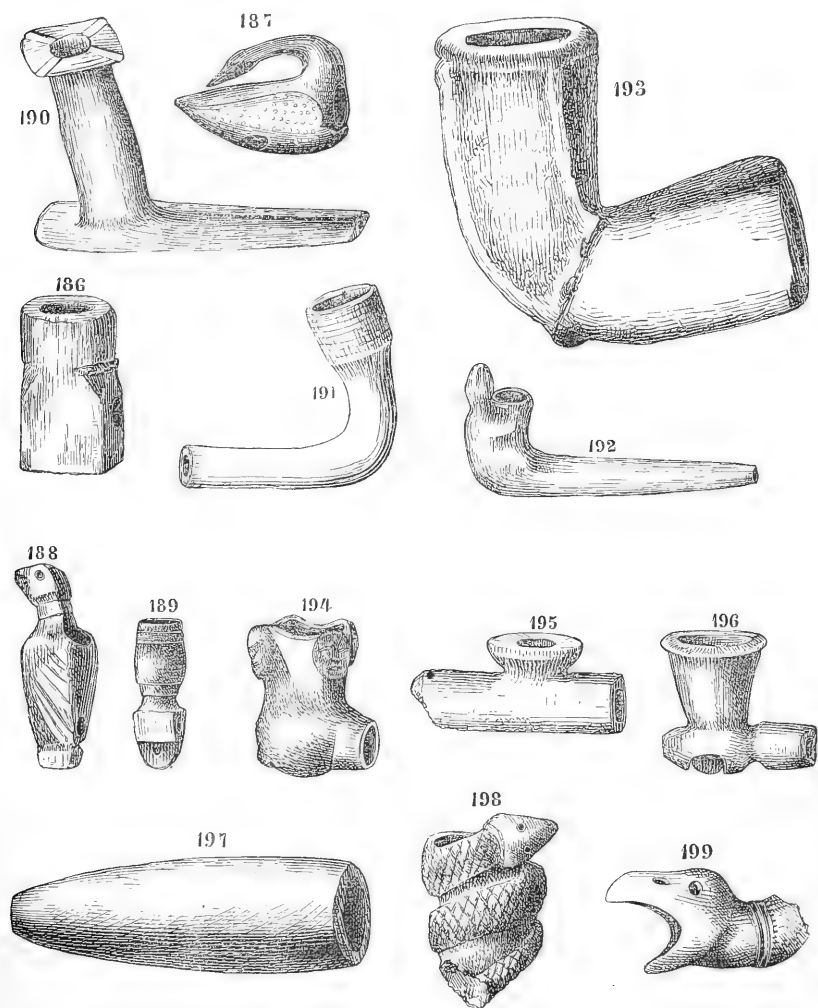


Fig. 36.
PIPES.

No. 186, argillaceous stone, from Pennsylvania; 187 represents a loon, and is of serpentine, from West Virginia; 188, from New York; 189,

from Ohio; 190, from Virginia; 191, serpentine, from New York; 192, steatite, from Pennsylvania, highly polished, representing a lizard; 193, soapstone, from North Carolina; 194 is from Texas; 195 from a mound in Kentucky. The latter is of compact limestone, and evidently of high antiquity. Its form is somewhat peculiar, in that it is the favorite among those who manufactured pipes from the catlinite or red pipestone, and has been continued into recent times. No. 196 is from Georgia; Nos. 198, 199 are made of clay, and were both found in Madison County, New York.

Stone pipes of entirely different character are found in California. They are represented by No. 197, of serpentine, from Santa Barbara County. These were in the form of tubes of various sizes and lengths, some of which are very large. Specimens have been found with a piece of bone inserted in the tapering end and cemented with bitumen for use as a mouth-piece, after the fashion in amber at the present day.

Allied in appearance to the California pipes are tubes which may have served as pipes, though neither in the instrument nor in the hole drilled therein is there apparently any provision for insertion in the mouth. The hole through the tube is sometimes biconical, having been drilled from both ends, and is smaller in the center, but quite too large at either end for the mouth. It has been suggested that these wide-mouthed pipes might have had two reeds inserted, which, being cemented with bitumen, were smoked through the nose. The smoke would thus be inhaled into the lungs, and so have a more powerful intoxicating effect. This, if true, might account for the small size of the bowl in many Indian pipes, a smaller quantity of tobacco being required in this than in the usual mode of smoking.

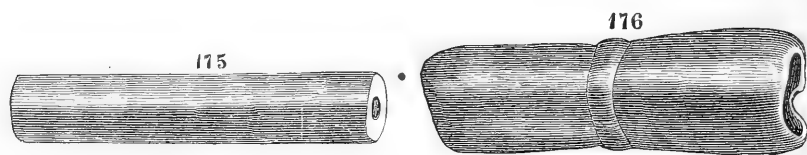


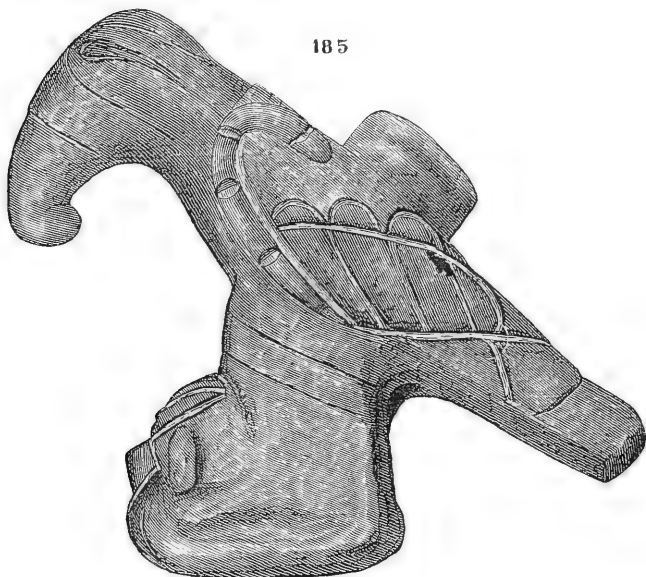
Fig. 37.
TUBES ($\frac{1}{2}$).

The material was soapstone, slate, and chlorite. Nos. 175 and 176 are from Tennessee.

The name "calumet pipes" has been given to those of large size smoked with a stem and representing usually a bird, animal, and sometimes a human figure. They are thus called by the Indians on account of their bulk and their use on occasions of great ceremony.

No. 185 is one of the finest possessed by the Museum, and is from Kentucky.

185



$\frac{1}{5}$
Fig. 38.

CALUMET PIPE.

(Cat. No. 16697, U. S. N. M. Received from the Kentucky University.)

BONE IMPLEMENTS.

The adoption of bone instead of stone for the implements of the prehistoric man differed widely in different countries. It is difficult to give satisfactory reasons therefor. It has been said that bone implements were not made in the United States, because the stone was so easily obtained. But in France, where bone implements are in greatest profusion, the flint suitable for chipping, and of which the finest implements could be and were made, was to be found, and is still very abundant. Bone, horn, and ivory were used indiscriminately, and served, according to the need, as perforators, points, harpoons, fish-hooks, etc. They were often drilled, and so formed objects of suspension, ornaments, etc. Hollow bones might serve as tubes. They might be also sawed to serve as rings or beads of varying size and length. One of the most interesting varieties of implements in bone are those found almost only at the prehistoric cemetery at Madisonville, Ohio, by Dr. Metz and Mr. Low. Any discoveries made, information obtained, or specimens found of scientific interest should be reported. (Fig. 39.)

COPPER IMPLEMENTS AND ORNAMENTS.

Implements and ornaments of this metal are shown in figure 40. They need not be described; their appearance will be sufficient. The remarks concerning the fraudulent character of some specimens sought to be foisted upon museums and collectors, and the necessity for the greatest care concerning the preservation of proofs and of genuineness, apply with even greater force to copper implements than to those of stone.

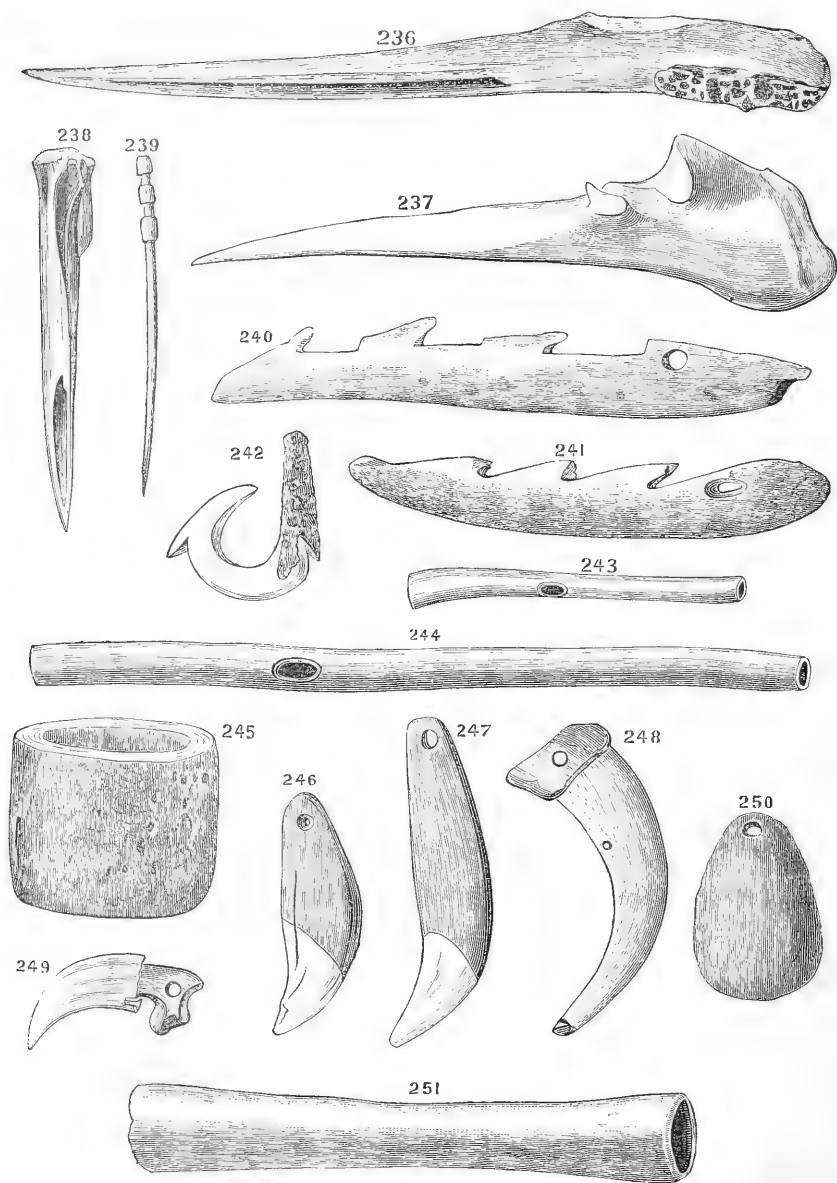


Fig. 39.
BONE IMPLEMENTS ($\frac{1}{2}$).

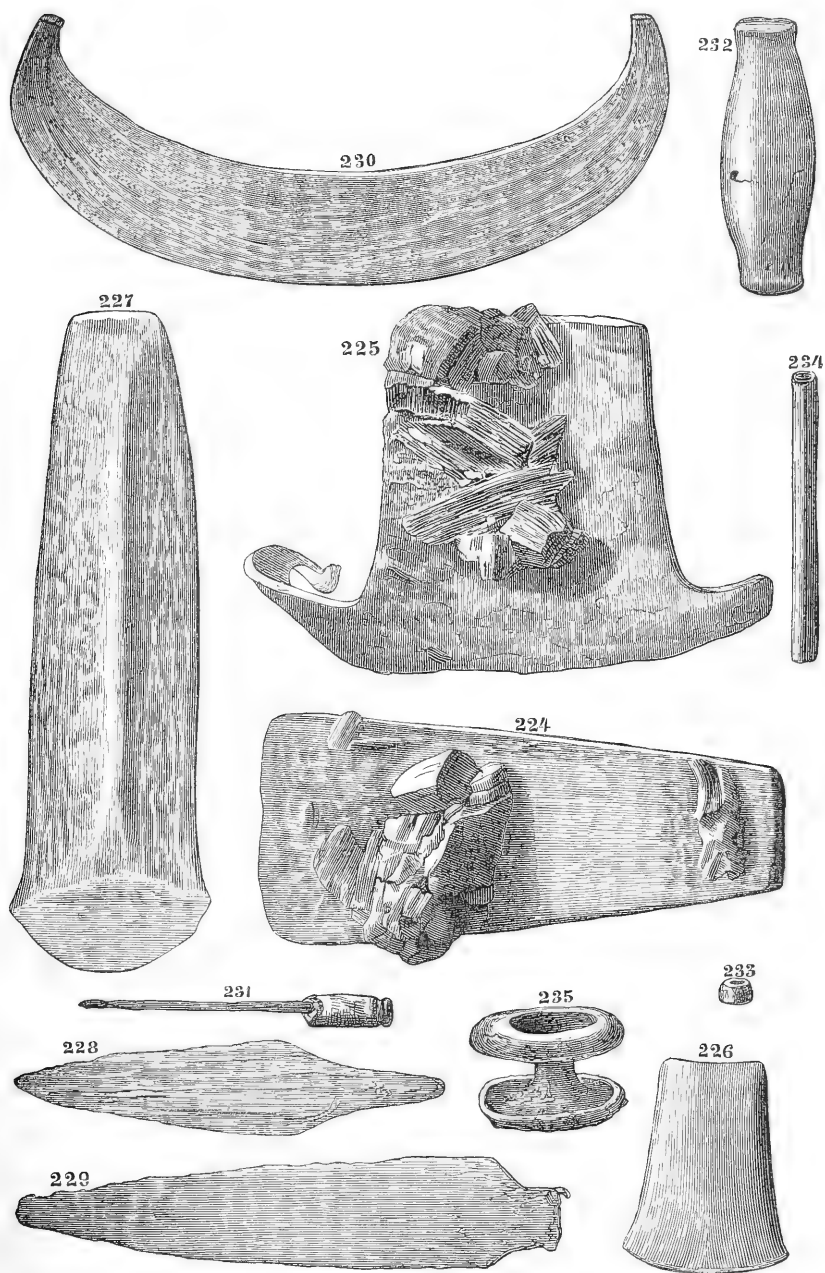


Fig. 40.

COPPER IMPLEMENTS AND ORNAMENTS FROM THE UNITED STATES.

HUMAN REPRESENTATIONS.

Occasionally, though rarely, specimens of sculpture representing the human face or figure have been found in the United States. Those represented in the cuts are mostly from Mexico, but they will serve as illustrations. In consequence of their rarity and the superior art displayed, they have been much sought, and these with representations of



Fig. 41.

HUMAN REPRESENTATIONS.

animals have been subjects of fraudulent manufacture. The fortunate finder of such a specimen should take every means possible, by the calling of witnesses, identification of the precise locality, the preservation, if possible, of the matrix or bed in which it is found, and by any other means, to preserve the evidences of its authenticity and genuineness.

SHELL IMPLEMENTS AND ORNAMENTS.

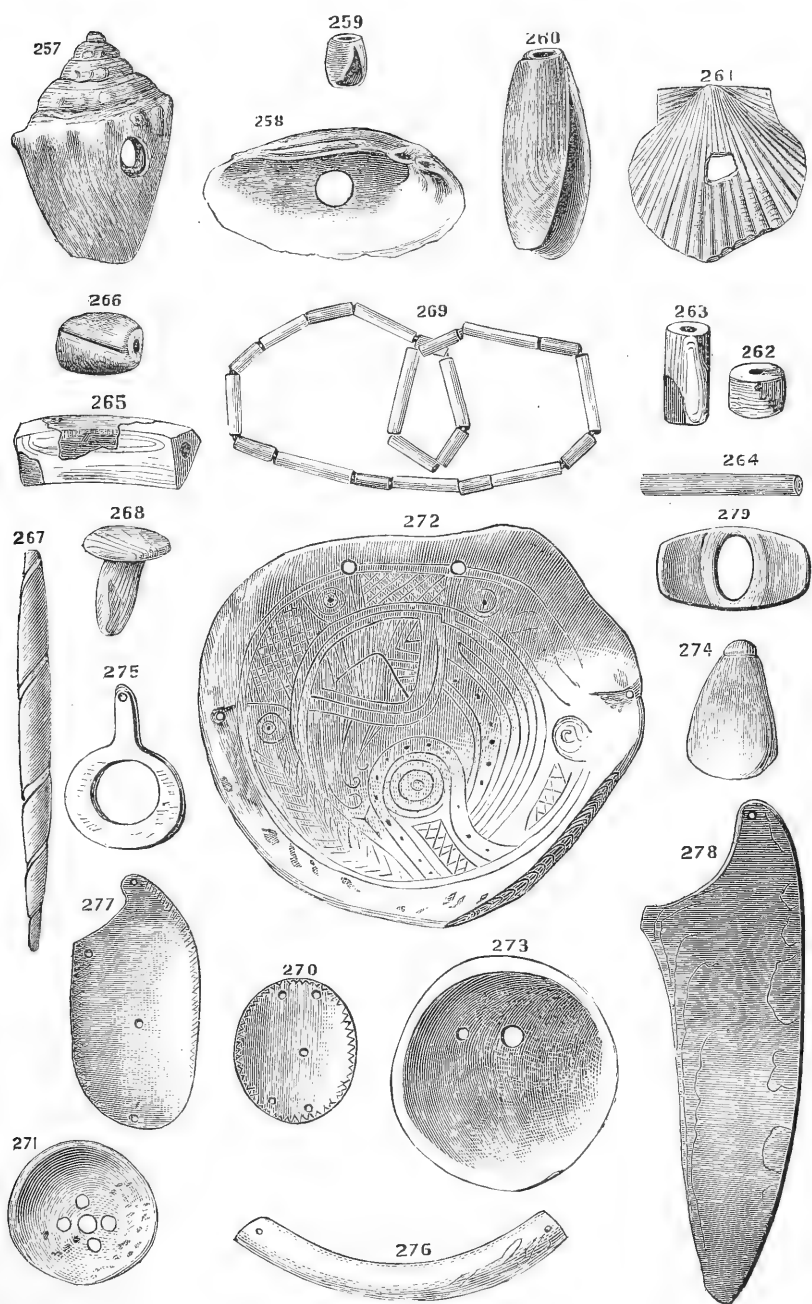


FIG. 42.—Shell implements and ornaments (C).

The various shells of the rivers and ocean furnished a material of great value to prehistoric man, and one which he could without much labor apply to a variety of uses. Small shells were perforated and used as beads; others were cut from the clam and mussel shells, which furnished the wampum. The haliotis was ground from the back and center so as to form bracelets. The same ornament made in the same way has been found in great numbers by the brothers Siret in their late discovery in southeastern Spain. The most interesting, as well as artistic, of the ornaments made from shell are the gorgets, which are especially noticeable for their engravings. They are sometimes cut so as to represent, upon the outside, a human face, but many have been found beautifully engraved in elaborate designs much resembling the mythologic art of Mexico and Central America. No. 272, found in Tennessee, represents one of these.

POTTERY.

The prehistoric pottery of Mexico and Central America forms a special group; that from the Pueblos of Arizona and New Mexico, another; while that made by the North American Indian constitutes a third group. Each of these has distinctive characteristics.

The pottery of the North American Indian is in some respects like the dolmen pottery of Europe, although it differs in many details of form, mode of manufacture and ornamentation. The North American Indian used neither wheel nor furnace, nor did he, except rarely, decorate it with colors. The clay was frequently mixed with pounded shells. The decoration of pottery made in the eastern portion of the United States was effected by incised lines and dots, with various combinations. The spiral and volute were employed. Among the Southern Indians much of the decoration was made by the impress of textile fabrics, sometimes with only a string or cord. In the interior, and principally on the Mississippi River, the pottery vessels were made to represent sometimes the human form, sometimes animals. There was a much greater prevalence of the bottle-form in the United States than in Europe.

Prof. W. H. Holmes, of the Bureau of Ethnology, has written an interesting monograph upon aboriginal pottery in the United States, and the late Col. James Stevenson described the Zuni and Pueblo pottery. Both these papers have been published in the Reports of the Bureau of Ethnology, and are profusely and elegantly illustrated.

The following are given as specimens of what may be found in mounds:

No. 280 is from a mound in Tennessee; 281 from a mound in Illinois; 282 from a mound in Union County, Kentucky; 283 a mound in Tennessee; 284 a mound in Arkansas; 285 a mound in North Carolina; 286, which is a bright red and the only one painted, is from a mound in Tennessee; 287 is from a mound in Louisiana.



FIG. 43.—Pottery (4).

ANCIENT INDIAN MATTING—FROM PETIT ANSE ISLAND, LOUISIANA.

By THOMAS WILSON.

In the hall devoted to the collections of prehistoric anthropology in the U. S. National Museum there is exhibited a mat of interlaced or woven reed or cane which has been claimed, by reason of its locality, condition, and association, to be evidence of the great antiquity of man, and as tending to establish his existence during the tertiary geologic period,* Plate CVII.

The label affixed to this specimen tells its whole story.

Specimen of ancient matting from Petit Anse Island, near Vermilion Bay, Coast of Louisiana. Presented to the Smithsonian Institution by J. F. Cleu, esq., May, 1866. "Petit Anse Island" is the locality of the remarkable mine of salt rock discovered during the late rebellion, and from which, for a considerable period of time, the Southern States derived a great part of their supply of this article. The salt is almost chemically pure, and apparently inexhaustive in quantity, occurring in every part of the island (which is about 5,000 acres in extent) at a depth below the surface of the soil of 15 or 20 feet.

The fragment of matting here exhibited was found near the surface of the salt and about 2 feet above it were the remains of tusks and bones of a fossil elephant. The peculiar interest in regard to the specimen is in its occurrence *in situ* 2 feet below the elephant remains, and about 14 feet below the surface of the soil, thus showing the existence of man on the island prior to the deposit in the soil of the fossil elephant. The material consists of the outer bark of the common southern cane (*Arundinaria macrosperma*), and has been preserved for so long a period both by its silicious character and the strongly saline condition of the soil.

The letter of transmission accompanying this specimen is from Mr. Cleu, dated New Orleans, May 10, 1866. It forms the basis of the label. He sends specimens of the rock salt, pieces of the fossil bones, and tusk of the elephant, and then says:

Below the fossil of the elephant, near the salt, we found pieces of matting made of the enamel of the canes. That work was beautiful and well preserved. It tastes salty and looks as if it had been made a few weeks ago. If I had not taken them up myself I could not believe it possible that they were found where I have stated; many more will be found but more carefully dug up. We have bought the mines and nearly the whole island, and intend to go in operation on a large scale, etc.

An inspection of this specimen caused me to suspect its antiquity. When I remarked the small and thin strips of the substance and its fragility and compared them mentally with other objects of the same reputed age, as, for example, the fossil mastodon teeth and bones which

* Prehistoric America, Marquis de Nadaillac; edited by Professor Dall, p. 36.

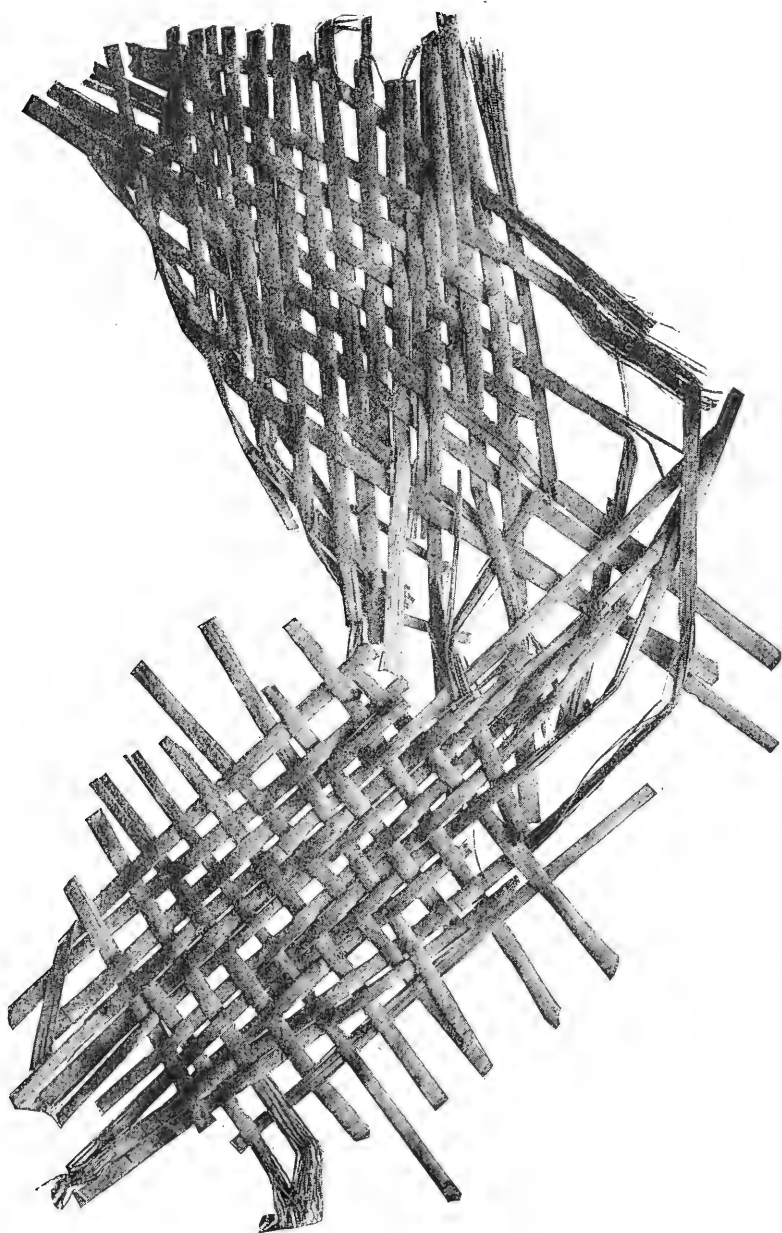
were found overlying it, and saw the effect of time upon them I became more than ever dubious of the high antiquity claimed for this matting. I submitted it to Professor Mason, who has made a special study of the basket-makers of antiquity.* He pronounced it at once to be a specimen of the common basket work of the Southern Indian, probably Cherokee. As to its actual antiquity he could give no opinion. Those Indians had made such plaited work ever since our earliest knowledge of them, and still continue it. He said one could purchase at the present day in the market at New Orleans modern Indian baskets of the same work and in every way similar.

An examination of the record of the Smithsonian Institution developed the following facts bearing upon the subject of the antiquity of this specimen:

In the summer of 1866, not long after the receipt of this specimen of matting from Mr. Cleu, Professor Henry, Secretary of the Smithsonian Institution, directed, or requested, Prof. E. H. Hilgard to undertake a geologic examination of the Louisiana salt region, the particular outcropping of which had been discovered in May, 1862, on this island of Petit Anse. Professor Hilgard availed himself of all former publications, interested numerous scientific gentlemen with him, and made an extensive geologic investigation, commencing at Vicksburg and extending down the Mississippi to its mouth, thence west up the Gulf coast to Vermilion Bay, and finishing with the five islands located therein, one of which was Petit Anse. The results of his investigations are published in the Smithsonian "Contributions to Knowledge," Vol. XXIII, and is No. 248 of the regular series. Of his conclusions as to the geologic formation of this country, or of this island, it is unnecessary to speak. He does not mention or refer in any manner to the discovery of this piece of basketry, which had been presented to the Museum only in the May previous to his detail, and which one may suppose contributed somewhat to the necessity for his investigation. The following paragraph from his report, however, bears upon the subject (page 14). He says:

Up to the time of Dr. Goessmann's visit (in November, 1866) all the borings and pits which had reached the salt had been sunk in detrital material washed down from the surrounding hills, and frequently inclosing the vestiges of both animal and human visits to the spot. Mastodon buffalo, deer, and other bones; Indian hatchets, arrow-heads, and rush baskets, but above all an incredible quantity of pottery fragments which have been extracted from the pits. The pottery fragments form at some points veritable strata 3 to 6 inches thick; this is especially the case where Mr. Dudley M. Avery found what appeared to have been a furnace for baking the ware (a process very imperfectly performed), and near it three pots of successive sizes, inside of each other. The pots must be presumed to have subserved the purpose of salt-boiling; for although human handiwork has been found so close to the surface of the salt as to render it probable that its existence in mass was once known, yet the boiling process alone has been resorted to within even traditional times until the discovery, at the bottom of a salt well, of the solid rock-salt.

* Smithsonian Report, 1884, pp. 291-306.



ANCIENT INDIAN MATTING.

From Petit Anse Island, near Vermillion Bay, Louisiana. Presented by J. F. Cleu, 1866. (Cat. No. 1133, U. S. N. M.)

With a foot-note thus:

It is very positively stated that mastodon bones were found considerably above some of the human relics. In a detrital mass, however, this can not be considered a crucial test.

The discovery or finding of this piece of matting by Mr. Cleu in the position indicated, to wit, above the rock-salt, but beneath the fossil bones, tusks, etc., of the elephant or mastodon may be conceded. There seems to have been nothing strange or suspicious in such a discovery. But finding it in the detrital mass, as reported by Professor Hilgard, robs it of all weight as evidence of the antiquity of man. The surface or top of the solid body of rock-salt appears to have been somewhat irregular, to have conformed generally to the surface of the earth above it, to have been at a depth of about 15 feet, to have been principally under the line of high-tide water, though at one place it appeared above. The island is quite small, nearly round, with an area of 2,240 acres, and dotted over with hills, the highest being 180 feet. From this description it can be easily understood, as Professor Hilgard says, that a "detrital material was washed down from surrounding hills and frequently inclosing the vestiges of both animal and human visits to the spot." Mr. Cleu says that many more of these pieces of matting will be found, etc.

In the light of these examinations the position of this matting is explained, and we see that it has no bearing upon the question of the antiquity of man. The same claim would apply with equal propriety to the buffalo, deer, and other bones, to the Indian hatchets and arrow-heads, and to the incredible quantity of pottery fragments found by Professor Hilgard. These, together with the matting and the fossil mastodon bones and tusks, have all been washed down from the surrounding hills and swept back and forth, in no one knows how many relative changes of position, by each recurring tide. The matting being found under the mastodon fossils in the detrital mass is no evidence that this was their original position or that the deposition of both may not have belonged entirely to modern times.

RESULTS OF AN INQUIRY AS TO THE EXISTENCE OF MAN IN NORTH AMERICA DURING THE PALEOLITHIC PERIOD OF THE STONE AGE.

By THOMAS WILSON.

The existence and the antiquity of the paleolithic period in Europe had been so well established by the investigations of European prehistoric anthropologists as to neither require demonstration nor admit of discussion.

The prehistoric people of North America, as they have been generally known, whether mound-builders or Indians, all belonged to the neolithic period of the stone age, unless there is to be established an age of copper.

Their cutting implements of stone were not brought to an edge by chipping as was done in the paleolithic period, nor were these implements chipped in the sense of the term as used in connection with that period. On the contrary, they were polished or made smooth by rubbing against or upon another stone. Their cutting edges were made sharp in the same way. This was a new invention, and constituted the distinctive mark between the civilization of the two periods. The peoples of the neolithic period had much the higher civilization. They made pottery, had flocks and herds, a knowledge of agriculture, a society organized into tribes or bands, buried their dead with ceremony, mourned their loss, and erected burial monuments.

They were numerous in North America, and spread over or occupied, at one time or another nearly, if not quite, the entire continent; their tribes were many, they employed different languages, made and used a variety of curious implements, and their monuments are yet a source of wonder and surprise. These things have rendered the mine of ethnologic lore in America so rich and with such great opportunities, that the attention of the anthropologist and ethnologist of our country have been fully absorbed and left with but little incentive to investigate that ruder but earlier period—the paleolithic.

My attention has been turned towards this period, and I determined to give it a share of that consideration to which I felt it was entitled. I make but small claim to original discovery; most of my facts have been heretofore known, but they were isolated, disconnected, unrecognized, and almost valueless. I have now grouped them, here and there

filled the gaps with new facts, formulated all, and hope I have established their bearing one upon another, and thus proved (to my own satisfaction, at least) the general occupation of the United States by man during the paleolithic period. Other persons have heretofore expressed their belief in this proposition, but as yet it has not been proved. The evidence which they presented may have been good, but it was insufficient.

Many years ago Signor Capellini, rector of the University of Bologna, visited the United States, and reported having found at Burlington, Iowa, a paleolithic implement of white flint.*

Professor Joseph Leidy, in 1873, reported having found paleolithic implements in flint, jasper, and quartzite at or near Fort Bridger, Wyoming.†

Professor Leidy says :

“In some places the stone implements are so numerous, and at the same time so rudely constructed, that one is constantly in doubt when to consider them as natural or accidental and when to view them as artificial. Some of the plains are so thickly strewn with natural and artificial splintered stones that they look as if they had been the battle-fields of great armies during the stone age.”

But Dr. Leidy did not know these implements to be what they really were, that is, implements of the paleolithic period. His friend Dr. Van A. Carter, residing at Fort Bridger, and well acquainted with the language, history, manners, and customs of the neighboring tribes of Indians, informed him that they knew nothing about these implements. He reported that the Shoshones looked upon them as the gift of God to their ancestors.

The discovery by Dr. Abbott of paleolithic implements in the gravel drift of the Delaware River at Trenton was the leading discovery which bore testimony to the existence of man in America during the paleolithic period. His discovery was valuable, and no doubt is to be thrown upon the genuineness of the implements. They tend to prove as well the antiquity as the existence of the paleolithic period in America. By this discovery Trenton occupies much the same relation to American prehistoric anthropology that Abbeville does to European.

Less known, but believed to be equally authentic, was the discovery of paleolithic implements by Miss Franc E. Babbitt in 1879 at Little Falls, Minnesota; by Dr. Metz, in the river gravel of the Little Miami at Loveland, near Cincinnati; by Professor McGee of a possibly paleolithic spear-head of obsidian in the valley of Lake Lahontan in north-western Nevada; by Dr. Hilborn T. Cresson, of Philadelphia, at Claymont, Delaware, and Upland, Chester County, Pennsylvania, and of a supposed paleolithic fire-place or hearth, explained by Prof. G. K. Gilbert.

Conceding for these finds of paleolithic implements full authenticity,

* *Le Préhistorique*, par G. de Mortillet, p. 178.

† U. S. Geological Survey, 1872 (Hayden), p. 651, figs. 1-12.

they only show an isolated and widely scattered occupation by man during the paleolithic period. They are far from showing a general occupation as has been established in southern and western Europe. If the occupation shown by these finds was truly that of the paleolithic man I could not bring myself to believe that it was restricted in this way, and I thought that his implements should be found elsewhere. This was needed to establish a general occupation, and a general occupation must be established before the scientific world would accept the fact as proved.

My residence in Europe and my acquaintance with European prehistoric anthropology, especially that portion relating to the paleolithic period, caused me to be deeply interested in the question of the existence of man during a like period in America, and I began my investigations immediately upon my return. I found in the Museum many objects labeled "Rude and Unfinished Implements of the Paleolithic Type," and I queried whether they were not truly paleolithic. I was answered in the negative, and it was said that they were but the unfinished implements of the Indians; in fact, his *failures* when making the more finished and perfect implements. And it was further said that they were always found in connection, and associated with the more perfect implement. While it was not said that they could not be found under the surface or in gravels, yet it was declared that they had not been so found; on the contrary, all had come from the surface. The argument did not satisfy me, and I pushed my investigations and comparisons. I discovered that certain of the implements displayed in the Museum under the name aforesaid, had been found by Mr. E. P. Upham, my assistant, in times past on the hills around the city of Washington, chiefly those of Piney Branch and Rock Creek. Guided by him I visited the neighborhood and our searches were crowned with such success that in the first afternoon we found a greater number than we could carry home. I have since visited the same places in company with several scientific gentlemen of the Geological Survey, Professors Gilbert, McGee, Holmes, Henshaw, and Mr. DeLancey Gill, whose knowledge and experience were of great benefit. We were aided by Mr. S. V. Proudfit and Mr. E. R. Reynolds, who have pushed their explorations on the Eastern Branch of the Potomac and in the vicinity of the Chain Bridge. These rude implements were found everywhere in profusion.

Comparison is as good a rule of evidence in archaeology as in law. I applied it by comparing these unknown and unrecognized implements with those from foreign countries which were recognized and admitted as genuine implements made by man during the paleolithic period in those countries, and as representatives of its civilization. The result was not less surprising than gratifying. My examination proved to me that, though coming from lands however distant, from other continents separated from ours by wide oceans, these were all the same implements. Their identity was complete. Both showed the handiwork of

man, and were undeniably manufactured for the same purpose and representing the same civilization or culture. An examination and comparison of the implements themselves are necessary in order to understand the full force of these statements.

The remarks of Dr. Leidy as to the great number of these implements which he found in the Bridger basin apply with equal force to the bluffs and hills around the city of Washington. The reports of these implements in the Museum, from the District of Columbia, are as follows :

Mr. Shoemaker.....	22
Mr. Reynolds	221
Mr. Proudfit	50
Mr. Wilson.....	299
Mr. Upham	34
Mr. Webster	119

Making a total from the District of Columbia of..... 745

Extending these investigations over the United States, Professor Langley, the Secretary of the Smithsonian Institution, at the instance of this Department, issued in January, 1888, Circular No. 36, already mentioned, and of which the following is a copy :

CIRCULAR CONCERNING THE DEPARTMENT OF ANTIQUITIES.

The Smithsonian Institution desires answers to the following questions concerning that class of American aboriginal stone relics which have been heretofore denominated "rude or unfinished implements of the paleolithic type."

Cuts of some, together with their localities, are herewith given.

Question 1. How many of these rude stone implements have you in your collection?

Question 2. Do you know of any in other museums or collections?

Question 3. Of what material are they made?

Question 4. Where have they been found?

(1) As to locality.

(2) Position, condition, and associated with what objects.

(3) Whether on or under the surface, and if so, at what depth, and in what kind of geologic formation.

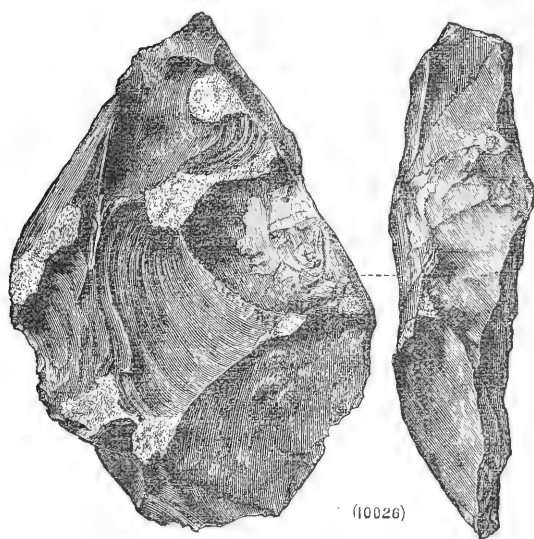
(4) Were they found in mounds, tombs, or other ancient structures.

(5) Were any other ancient implements found with them, and if so, of what kind.

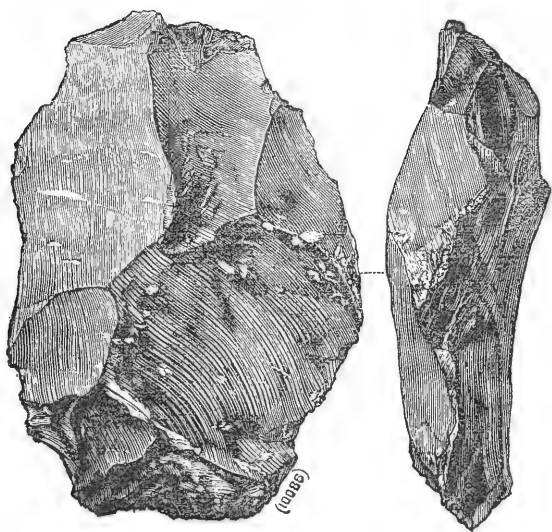
(6) Did their deposit seem to be accidental or intentional.

(7) Have they been described in any publication, and if so, in what, and where can it be obtained.

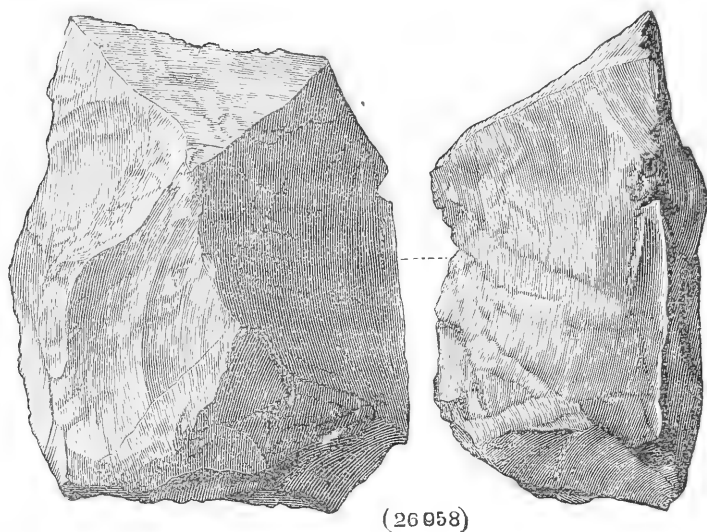
(8) Can you forward specimens (as many as possible) to this Museum in exchange for publications or duplicate specimens.



1
UTAH. DR. F. V. HAYDEN.



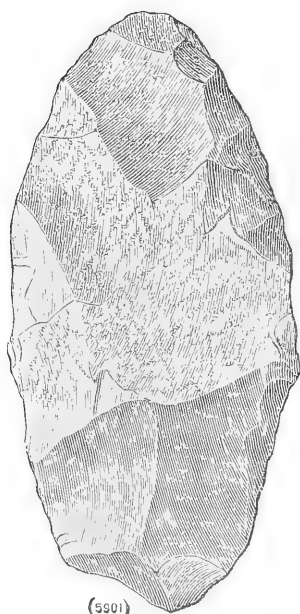
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UTAH. DR. F. V. HAYDEN.



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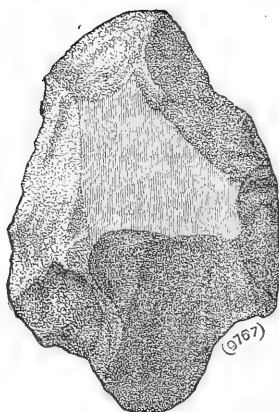
NEW JERSEY. DR. C. C. ABBOTT.



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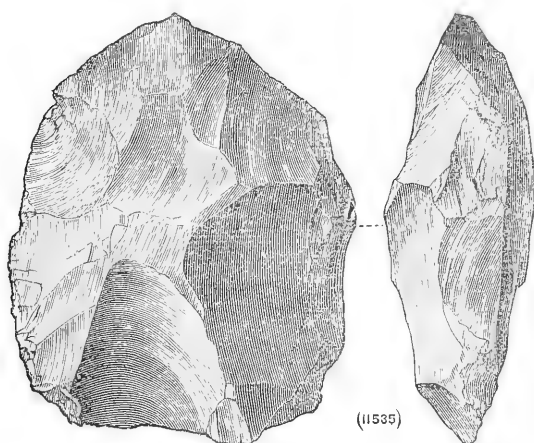
MARYLAND. O. N. BRYAN.



(9167)

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MARYLAND. O. N. BRYAN.

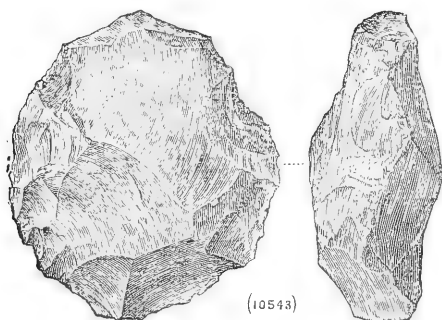


(11535)

WYOMING TERRITORY

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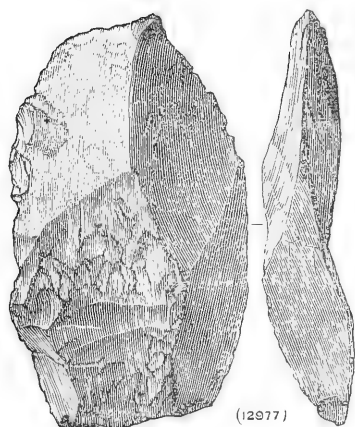
DR. JOS. LEIDY.



(10543)

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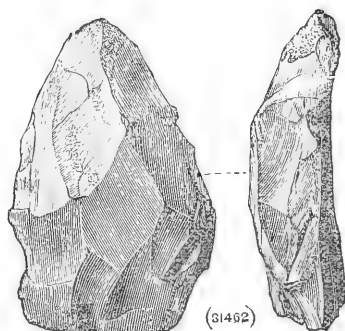
WYOMING TERRITORY. DR. F. V. HAYDEN.



(12977)

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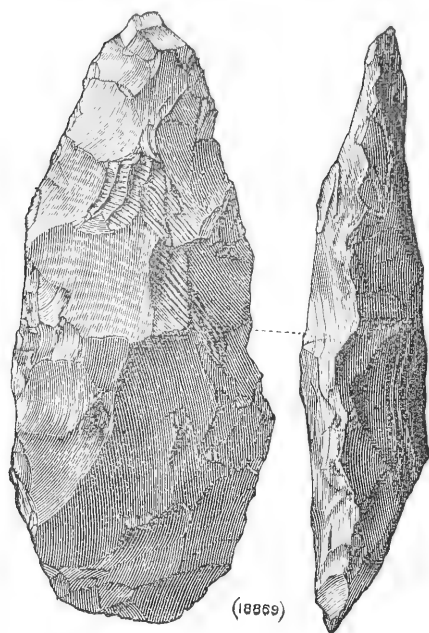
OREGON. PAUL SCHUMACHER.



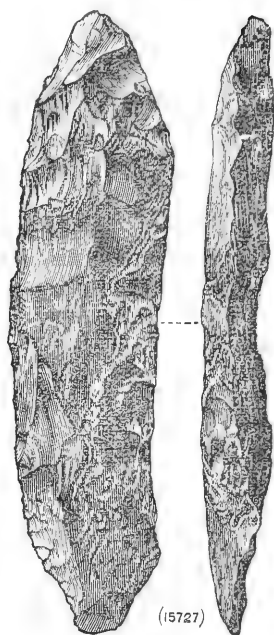
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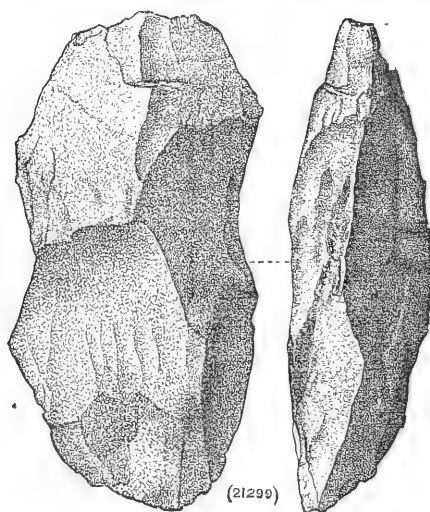
KENTUCKY. F. BRAUN.

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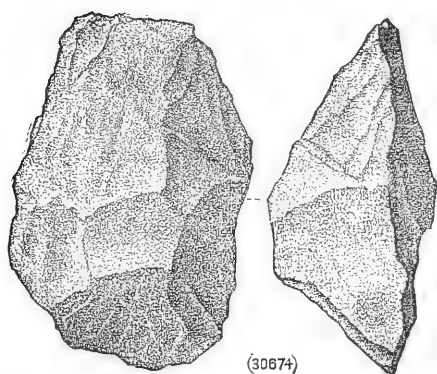
TEXAS. J. VAN OSTRAND.

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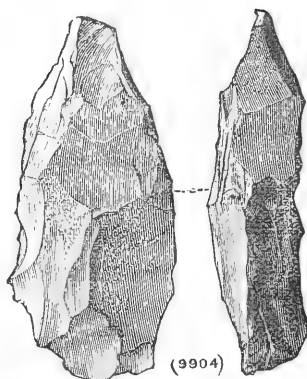
CALIFORNIA. W. G. HARFORD.

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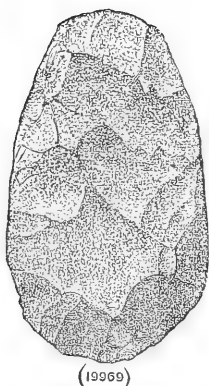
NORTH CAROLINA. HOWARD HATWARD.

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PENNSYLVANIA. A. F. BERLIN.

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TENNESSEE. J. PARISH STELLER.

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TENNESSEE. W. M. CLARKE.

 $\frac{1}{2}$

DISTRICT OF COLUMBIA. JAMES WEBSTER.

The Museum received two hundred and nine responses. The number of implements reported by the correspondents from twenty-three States and Territories is six thousand seven hundred and sixty-two, but twenty-eight persons report an indefinite number in their collections which is incapable of addition: "A few," "some," "many," "plenty," "hundreds," "a large number," etc. These have not been counted into this aggregate. Thirty-three persons sent one thousand one hundred and eighty-nine of the "rude implements" for which they all received an equivalent in exchange. The objects actually received from those thirty-three persons were nearly double the number mentioned. Those

which from their form, appearance, material, mode of fabrication, were decided not to be paleolithic, have been eliminated.

A tabulated statement showing the results accomplished by the distribution of this circular is here given :

Name of State.	Answers received.	Implements reported.	Number sent.	Original number in Museum.	Total.
Maine.....	9	196	19	3	218
Vermont.....	6	70	27	.....	97
Massachusetts.....	14	79	17	96	393
Connecticut.....	3	8	.....	19	27
New York.....	20	530	95	7	632
New Jersey.....	3	348	2	41	591
Pennsylvania.....	20	1,000	180	39	1,219
Maryland.....	4	33	.....	59	92
District of Columbia.....	8	869	239	298	1,406
Virginia.....	3	400	26	13	439
North Carolina.....	2	13	23	5	41
South Carolina.....	3	.....	.....	.....	.....
Georgia.....	.....	.....	.....	10	10
Florida.....	1	20	.....	31	51
Alabama.....	3	1	8	25	34
Texas.....	1	.....	.....	6	6
Ohio.....	29	1,215	71	66	1,252
Indiana.....	13	489	26	26	541
Illinois.....	17	169	.....	23	212
Kentucky.....	2	25	.....	15	40
Tennessee.....	5	48	30	18	96
Michigan.....	9	224	6	.....	230
Wisconsin.....	6	21	.....	6	27
Iowa.....	3	Few.....	10	2	12
Missouri.....	7	335	10	5	350
Arkansas.....	2	86	.....	4	90
California.....	5	57	.....	38	95
Minnesota.....	2	.....	.....	48	48
Oregon.....	.....	.....	.....	7	7
Kansas.....	5	.....	.....	.....	.....
Nebraska.....	1	.....	.....	3	3
Colorado.....	.....	.....	.....	8	8
Utah.....	1	.....	.....	25	25
Wyoming.....	.....	.....	.....	4	4
Arizona.....	1	.....	.....	.....	.....
Canada.....	1	106	.....	.....	106
	209	6,762	789	950	8,502

RECAPITULATION.

Number of implements reported.....	6,762
Number sent to Museum.....	789
Number already in Museum.....	950
	1,739
	8,501

In the science of prehistoric anthropology almost the sole means of study are the implements and monuments made and used by prehistoric man. To render this study available it becomes of prime importance that we should know not only the locality of the implement or object studied, but also its position, condition, and relation to other objects with which it may be found associated. It is coming to be recognized as the duty of every discoverer, if he would make his find of any value, to note carefully its condition, position, and association with other objects. His failure to do this destroys its principal value.

I have endeavored during the past year to secure such a description of all specimens received. The official catalogues of the Museum are furnished to us with their numbers completed, one line only to each number, and this is subdivided so as to give name, date, locality, donor, etc., which, with the official number, fills the line. It is manifestly impossible to give in this catalogue the description needed to make the specimen appreciated or valued. It is almost, if not quite, as impracticable to give the specimen its proper value if all the information concerning its discovery is allowed to lie in the registrar's files and to be found only there. Therefore I have briefed all letters giving such information concerning the specimens received, putting it in the most concise form possible, which I transmit with this report, to the end that they may be printed with it and so be made accessible to the student, to the public, and to the office.

The following are briefs of these letters. The type Solutreen mentioned refers to leaf-shaped implements, which would in Europe be classed as paleolithic. Whether they are to be so classed in America awaits future investigation. The other paleolithic implements, usually unmentioned in the brief, refer to Chellian implements which are not considered doubtful:

C. M. Sawyer, Mechanics' Falls, Maine, April 2, 1888. Sends sixteen specimens, seven of which are paleolithic (type Solutreen). Material, jasper. Found on the surface of the shores of Sebago Lake and at Raymond, Cumberland County, Maine. Accession 20446; catalogue Nos. 137593-137606.

Prof. G. H. Perkins, University of Vermont, Burlington, Vermont, February 15, 1888. Has many rude implements. Material, bluish-gray quartzite, argillite, hornstone, and some of granite. Found on the surface near streams. Deposit accidental. Sends forty-six specimens, eighteen of which are paleolithic. Accession 20554; catalogue No. 139429.

Prof. G. H. Perkins, University of Vermont, Burlington, Vermont, June 12, 1888. Sends eighteen specimens from Bristol Pond, Monkton, Vermont, four of which are paleolithic. Surface finds. Accession 20734; catalogue Nos. 139659-139665. Has very few larger than the largest of this lot.

Prof. G. H. Perkins, University of Vermont, Burlington, Vermont, July 16, 1888. Sends fifty rude implements, five of which are paleolithic. Found on the surface in the Missisquoi Valley, northern Vermont, *i. e.*, Swanton and Highgate. Accession 20878; catalogue Nos. 139724-139730.

Peabody Academy of Science, Salem, Massachusetts, February 6, 1888. J. Robinson, treasurer, in charge of Museum. Has a large number of rude implements from 1 to 6 inches in length. Sends seven specimens (paleolithic) from Essex County,

Massachusetts. Material, porphyritic felsite. Found down to 18 inches below the surface. Accession 20159; catalogue Nos. 137610-137616.

Willard Nye, jr., New Bedford, Massachusetts, May 9, 1838. Sends ten specimens; disks of quartz, porphyry, etc. Found on the surface at the west end of Martha's Vineyard Island, Massachusetts, associated with arrow and spear heads, drills, scrapers, and fragments of pottery. Accession 20579; catalogue No. 139439. These probably belong to the shell-heaps, and may not be paleolithic.

Merritt Willis, West Farms, New York City, February 12, 1888. Sends two rude implements (paleolithic) from Trenton, New Jersey, and one from West Chester, New York. Accession 20331; catalogue Nos. 139194-139195.

Dr. A. L. Benedict, Buffalo, New York, March 16, 1888. Sends thirty flint implements (type Solutreen) from Buffalo, New York, and five rude implements (type Solutreen) from Fort Erie, Canada. They were found on the sites of Indian villages associated with other stone implements. Deposit accidental. These rude implements are found in great number all around the falls on both sides. Accession 20365; catalogue Nos. 139291-139292.

F. Roulet, Newark Valley, New York, June 4, 1883. Sends sixteen specimens, fourteen of which are paleolithic (type Solutreen). Material slate, limestone, etc. All found in Pennsylvania, mostly along the banks of the Susquehanna River. Accession 20688; catalogue Nos. 139618-139620.

A. G. Richmond, Canajoharie, New York, June 17, 1888. Sends collection of three hundred and ninety-five specimens, embracing hammerstones, scrapers, and arrow-points (flint and chert), notched sinkers, fragments of pottery, shell, bones, etc., from old Indian village sites in the Mohawk Valley, Montgomery County, New York. Only four of these specimens can be classed as paleolithic. Accession 20784; catalogue Nos. 139667-139720.

Dr. B. D. Skinner, Greenport, New York, February 20, 1858. Sends twenty rude implements (paleolithic) of quartz; found upon the surface over glacial drift in the vicinity of Greenport, Long Island, New York. Accession 20238; catalogue Nos. 139037-139041. These probably belong to shell heaps, and may or may not be paleolithic.

W. W. Adams, Mapleton, New York, February 27, 1888. Sends five specimens (type Solutreen). Material, chert; found on the surface in the vicinity of Mapleton. Accidental deposit. Has no more. Accession 20248; catalogue No. 139150.

W. W. Tooker, Sag Harbor, New York, March 9, 1888. Has one hundred rude implements, majority of quartz, others of slate, argillite, etc.; found on the surface, in shell-heaps, on village sites, and in deposits from 3 to 5 feet in depth. Sends sixteen rude implements (paleolithic), principally of quartz; from the surface and from shell-heaps, in the vicinity of Sag Harbor, New York. Has never found them (rude implements) as described by Dr. Abbott. Has found them at the talus of the bluffs. Rude axes have been found in digging wells at great depths.

Accession 20418; catalogue Nos. 139340-139355. These probably belong to shell-heaps, and may or may not be paleolithic.

Howard B. Davis, Reading, Pennsylvania, February 18, 1888. Sends twenty-two specimens, six of which are paleolithic; found along the Schuylkill River about one mile south of Reading in freshly ploughed fields. Deposit accidental. Accession 20210; catalogue Nos. 139031-139036.

J. M. M. Gerner, Muncy, Pennsylvania, February 13, 1888. Sends one hundred and fifty specimens and has one hundred and fifty left. These implements (type Solutreen) are from Muncy Valley, along west bank of Susquehanna River. Surface finds. None ever found in mounds. Accession 20191; catalogue No. 139026.

A. Sharpless, West Chester, Pennsylvania, February 6, 1888. Sends three specimens, two of which are paleolithic; found on the surface with chips of quartz on what was evidently an old camping ground near West Chester, Pennsylvania. Accession 20158, catalogue Nos. 137608-137609. Speaks of several nests (*caches*) found in his neighborhood on the Brandywine.

A. Sharpless, West Chester, Pennsylvania, March 30, 1888. Sends a leaf-shaped cutting implement from West Chester, Pa. Not paleolithic. Accession 20429; catalogue No. 139325.

A. Sharpless, West Chester, Pennsylvania, May 8, 1888. Sends thirty-two specimens, ten of which are paleolithic, all found on the surface at West Chester, Pennsylvania. Accession 20603; catalogue Nos. 139444-139447.

D. T. Millspaugh, M. D., Kendall, Pennsylvania, June 22, 1888. Sends a leaf-shaped implement and broken arrow-head from Pennsylvania, and one leaf-shaped implement from New York (not paleolithic). Accession 20907; catalogue Nos. 139738-139740.

D. T. Millspaugh, M. D., Kendall, Pennsylvania, May 16, 1888. Has two rude implements of impure silica found about 3 inches from surface on the bank of Tunnugwant Creek, 1 mile from Bradford, McKean County, Pennsylvania, associated with chip-pings, the latter, however, not in great enough number to be considered a manufactory. Deposit accidental. He says the locality is rich in mounds and the evidences of Indians.

E. R. Reynolds, Washington, District of Columbia, April 17, 1888. Has hundreds. Sends two hundred and fifty-nine specimens, two hundred and seventeen of which are paleolithic. Material quartz, quartzite, argillite, etc. All surface finds from different localities in the District of Columbia. Accession 20497; catalogue Nos. 139401-139412.

S. V. Proudfit, Washington, District of Columbia, March 17, 1888. Sends one hundred and thirty arrow-heads and one unstemmed spear-head from the District of Columbia. Not paleolithic. Accession 20358; catalogue Nos. 139244-139289.

Ernest Shoemaker, Washington, District of Columbia, February 12, 1888. Has about one hundred rude implements, all from the District of Columbia and neighboring country. Sends thirty-five specimens, twenty-two of which are paleolithic. Material principally of quartzite. Found on the surface. Accession 20175; catalogue Nos. 139007-139010.

Howard Shriver, Wytheville, Virginia, February 13, 1888. Sends two white quartz arrow-heads. Not paleolithic. Accession 20182; catalogue No. 139022.

Nathaniel S. Way, Accotink, Virginia, February 13, 1888. Has about four hundred of quartz and quartzite, found near Accotink on the surface. The implements are small near the river and larger inland. Sends twenty-two specimens, twenty of which are paleolithic. Accession 20185; catalogue Nos. 139028-139029.

Nathaniel S. Way, Accotink, Virginia, April 24, 1888. Sends six rude implements (paleolithic) of quartzite; found on the surface near Accotink, Fairfax County, Virginia. Accession 20507; catalogue No. 139413.

Howard Haywood, Raleigh, North Carolina, March 19, 1888. Has sixty specimens. Sends thirty rude implements, eight of which are paleolithic. All were found on the surface in the vicinity of Raleigh, on Crab Tree Creek, about 50 yards from the shore and about 12 feet above its level, associated with arrow-heads, broken pottery, and chips of flint. Light sandy soil with red clay subsoil. The deposit seemed to be accidental. Accession 20357; catalogue Nos. 139214-139243.

J. A. D. Stephenson, Statesville, North Carolina, February 6, 1888. Has quite a number, principally of quartzite containing some impurities which weathers slightly when long exposed. Found on the surface in Iredell, Alexander, and Catawba Counties, North Carolina. Sends three specimens of rude implements (type Solutreen). Material quartzite; found in *deposits* in Iredell and Alexander Counties, North Carolina. Many deposits of these implements found in this neighborhood; they are generally buried deeper in valleys and slighter on the mountains. No other implements found with them. Deposit intentional. None found in mounds. Accession 20183; catalogue Nos. 139023-139025.

J. A. D. Stephenson, Statesville, North Carolina, March 3, 1888. Sends thirty-four specimens, twelve of which are paleolithic. Material principally of quartzite—found

on the surface near Statesville, North Carolina. Accession 20479; catalogue Nos. 139356-139361.

J. R. Nissley, Ada, Ohio, March 14, 1888. Sends twelve specimens, five of which are possibly paleolithic (type Solutreen). Found on the surface at Red River Spring Creek and Elk Fork, Todd County, Kentucky, and Montgomery County, Tennessee. Accession 20345; catalogue Nos. 139200-139203.

J. Freshwater, Loudonville, Ohio, February 1, 1888. Sent one leaf shaped cutting implement. Not paleolithic. Found on the surface at Loudonville. Lives in a river valley where there is from 150 to 200 feet of drift; never found any worked implements in the gravel or drift. Accession 20189; catalogue No. 139027.

D. T. D. Dyche, Lebanon, Ohio, February 8, 1888. Sends forty-five specimens; all from Warren County, Ohio. Found on the surface, thirteen of which are paleolithic. Accession 20174; catalogue Nos. 138999-139006.

J. A. Stevenson, Akron, Ohio, March 16, 1888. Sends collections of three hundred and eighty-five specimens. Four rude implements (paleolithic) from Summit County, Ohio, and fourteen rude implements (paleolithic) from Juniata County, Pennsylvania. Accession 20371; catalogue Nos. 139293-139324.

Warren K. Moorehead, Xenia, Ohio, February 7, 1888. Has thirty rude implements of flint. Sends ten (paleolithic) implements from the undisturbed gravel, Little Miami River, Fort Ancient, Warren County, Ohio, and ten (paleolithic) from the gravel on the bed of "Old Town Run," 3 miles north of Xenia, Greene County, Ohio. Found 2 or 3 feet from surface, associated with flint flakes. Deposit accidental. Not found in mounds or tombs. Accession 20330; catalogue Nos. 139198-139199.

James C. Wright, Fredonia, Ohio, February 27, 1888. Sends fifty specimens, six of which are paleolithic (type Solutreen). Material flint or burr-stone. Found upon the surface in Licking County, associated with arrow and spear points. A few of the leaf-shaped implements have been found in mounds. Accession 20550; catalogue Nos. 139431-139438.

C. T. Wiltheiss, Piqua, Ohio, March 6, 1888. Sends fifty-seven specimens, principally of flint, seventeen of which are paleolithic (type Solutreen). These implements wash out of the east bank of the Miami River on the bottom lands, from a stratum of yellow clay covered by a layer of black loam 3 or 4 feet in thickness. Accession 20311; catalogue Nos. 139181-139193.

Carey Bell, Utica, Ohio, March 22, 1888. Has quite a number of rude implements, principally of chert or flint. Mostly surface finds, associated with finer (better finished) specimens. Sends twenty-five specimens, six of which are paleolithic. Accession 20413; catalogue Nos. 139326-139332.

H. W. Hanna, Warsaw, Indiana, February 9, 1888. Has several rude implements. Sends one specimen (paleolithic) of flint. Found on the surface in Wabash County, Indiana. Accession 20180; catalogue No. 139020.

W. H. Hanna, Warsaw, Indiana, May 28, 1888. Sends a small rude implement, a scraper, and three arrow-points. Found near the surface upon the bluffs above the bottom lands of the Wabash River, near Warsaw. Not paleolithic. Accession 20717; catalogue Nos. 139656-139658.

G. K. Green, New Albany, Indiana, March 17, 1888. Sends fourteen specimens (paleolithic), from ancient burying-ground at Clarksville, near mouth of Silver Creek, which empties into the Ohio about 1 mile east of New Albany, and is a dividing line between Clark and Floyd Counties, Indiana. Accession 20362; catalogue No. 139290.

G. K. Green, New Albany, Indiana, May 18, 1888. Sends eight rude implements (paleolithic). Accession 20633; catalogue Nos. 139494-139501.

Dr. E. C. Black, Wheatland, Indiana, February 10, 1888. Has fifteen rude implements, found in a *cache* in the eastern part of Knox County, Indiana. Sends one specimen (type Solutreen). Accession 20178; catalogue No. 139018.

W. H. Adams, Elmore, Illinois, February 8, 1888. Sends sixty implements—flakes,

scrapers, cutting implements, etc., from Kitchen Mounds, in Peoria and Knox Counties, Illinois; also a map or chart of these mounds. Nothing paleolithic. Accession 20177; catalogue Nos. 139011-139017.

W. H. Adams, Elmore, Illinois, April 1, 1888. Sends two rude implements (paleolithic) of flint—surface finds from Peoria County, Illinois. Accession 20481; catalogue No. 139339.

James C. Null, McKenzie, Tennessee, April 30, 1888. Has twenty-five rude implements of flint—surface finds. Sends a collection of two hundred and seventy-one specimens from Carroll County, Tennessee, thirty of which are paleolithic. Accession 20545; catalogue Nos. 139414-139428.

C. L. Stratton, Chattanooga, Tennessee, February 17, 1888. Sends box of stone implements from northern Georgia and Alabama (four hundred and sixteen specimens); nothing paleolithic. Accession 20240; catalogue Nos. 139042-139055.

C. A. Thompson, Quincy, Michigan, February 22, 1888. Has a few made of sandstone, slate, and chert; found along the streams and in sandy ground. None have ever been found in mounds. Deposit seemed accidental. Sends eighteen specimens, three of which are paleolithic (type Solutreen). Accession 20353; catalogue Nos. 139205-139213.

Charles Ruggles, Bronson, Michigan, February 15, 1888. Sends three rude implements (paleolithic), also drawings of others in his collection. All found on the surface along the banks of two small brooks in Bronson, Michigan. Accession 20208; catalogue No. 139030.

William H. Sheldon, Climax, Michigan, April 2, 1888. Has forty-eight rude implements. Forty-seven are of flint, one of ironstone. Three were found on the surface. Forty-four were in a nest or *cache*. Not associated with any other objects. Deposit of the forty-four specimens intentional. Sends ten rude arrow and spear heads, etc. Surface finds from Kalamazoo County, Michigan. Nothing paleolithic. Accession 20807; catalogue Nos. 139624-139631.

J. E. Gere, Riceville, Wisconsin, May 21, 1888. Sends eighty stone implements—flakes, scrapers, arrow and spear heads, etc., and ten pieces of native copper. All from Wisconsin. Nothing paleolithic. Accession 20653; catalogue Nos. 139511-139520.

Horace Beach, Prairie du Chien, Wisconsin, February 6, 1888. Has twenty specimens of flint, some found in mounds and others on the surface. Sends fifteen specimens, none of Chellian type, three Solutreen. Accession 20171; catalogue Nos. 138985-138998.

Dr. F. A. Steinmeyer, Bonaparte, Iowa, May 22, 1888. Sends five paleolithic implements, one large and four small, found in the vicinity of Bonaparte, at a depth ranging from 2 to 5 feet under the soil, which is clay. They were found in their original positions and the deposit appeared to be accidental. Accession 20684; catalogue Nos. 139622, 139623.

Davenport Academy of Natural Science, Davenport, Iowa. W. H. Pratt, curator, June 19, 1888. Sends fifty-two specimens from Iowa and other States and Territories. Five rude implements (paleolithic) from Louisa County, Iowa, and eight small rude implements (paleolithic) from Alabama. The implements from Louisa County are from what is locally designated "the Old Fort Grounds," now and for many years in a corn-field. Forty years ago it was surrounded by an earth-wall averaging 4 feet in height. (See Proc. Davenport Acad. Nat. Sci., vol. I, p. 109.) Accession 20751; catalogue Nos. 139632-139655.

Marion Crawford, Kahoka, Missouri, February 27, 1888. Sends twenty-seven specimens from Clark and Lewis Counties, Missouri, ten of which are paleolithic. Found on the surface. Accession 20252; catalogue Nos. 139153-139179.

Charles Teubner, Lexington, Missouri, March 3, 1888. Has two hundred rude implements of chert, found on the surface in Boone, Montgomery, Warren, Gasconade, Osage, Cole, and La Fayette Counties, Missouri, principally La Fayette. Sends eleven card photographs representing flint arrow-heads, etc., from Gasconade and other

counties in central Missouri. Nothing paleolithic. Accession 20329; catalogue Nos. 139196-139197.

Dr. W. S. Newlon, Oswego, Kansas, February 8, 1888. Sends flint chips and fragments of leaf-shaped implements, found on the surface near Oswego. Not paleolithic. Accession 20181; catalogue No. 139021.

Dr. W. S. Newlon, Oswego, Kansas, March 16, 1888. Sends two flint cores, sixteen fragments of chipped implements, and one box of chips and flakes found on the surface near Oswego. Not paleolithic. Accession 20460; catalogue Nos. 139376-139378.

Dr. W. S. Newlon, Oswego, Kansas, May 7, 1888. Sends collection of flakes, arrow-heads, shells, etc., from the site of an old Indian village at Oswego. Nothing paleolithic. Accession 20581; catalogue Nos. 139440-139443.

Dr. Henry W. Coe, Mandan, Dakota, February 27, 1888. Sends one rude cutting implement from a mound near Mandan, Dakota. Not paleolithic. Accession 20253; catalogue No. 139180.

ABSTRACT OF LETTERS RECEIVED IN ANSWER TO CIRCULAR 36.

Albert I. Phelps, Damariscotta, Maine, February 14, 1888. Has fifteen rude implements. Material, feldspar and porphyry. Found at Revere, Massachusetts, (surface) Penaquid Pond Damariscotta, Maine, and from shell-heap at Friendship, Maine. The implements from Revere were associated with arrow-points, those from Penaquid Pond with rude arrow-points, scrapers, and fragments of pottery, those from the shell heaps with flakes, arrow-points, bone implements, and fragments of pottery.

George A. Boardman, Calais, Maine, February 9, 1888. Has no rude implements.

James E. Knowlton, Damariscotta, Maine, May 5, 1888. Has one hundred and forty-four rude implements of porphyry, jasper, quartz, etc.; found in Lincoln and Knox Counties, on the coast between Kennebec and George Rivers, and on borders of lakes and rivers further inland, also in and beneath shell-heaps and associated with the usual fragments and implements. Sends seventeen specimens from Lincoln County, Maine. These belong to the shell-heaps, and may not be paleolithic. Accession 20612; catalogue Nos. 139448-139461.

"The shell-heaps in this region may be divided into two classes—the recent and ancient. The recent shell-heaps contain objects of European make associated with the implements of the stone age, and the rude pottery in these heaps has pounded shells mixed in with the clay. Shell-heaps of this class where undisturbed are arranged in small mounds resembling cradle knolls and are not over three feet deep. The shell-heaps of the older period vary in depth from three inches to thirty feet. The pottery contained in them has gravel, pounded rock, or mica, mixed in with the clay; it breaks with a shelly fracture, and was made inside a closely woven basket, while that in the recent heap breaks with a spiral fracture indicating that the coil-method was employed in manufacturing it, although most of it, like that from the older heaps, plainly shows the basket marks. With one exception objects of European make have never been found in the heaps of this class. Around and beneath the shallow heaps is a black stratum formed of ashes and decomposed animal and vegetable matter, while the deeper heaps are irregularly stratified from top to bottom. Animal bones, pottery, and implements are more frequently found in these strata than in the shells. The decaying of the branches used by the savages as bedding, the rubbish accumulating around a savage habitation, and finally the decaying of the habitations themselves have, I believe, contributed largely to the formation of these strata in and about the shell-heaps."

A. T. Gamage, Damariscotta, Maine, February 28, 1888. Sent five rude implements. Material, black hornstone and quartz. Found in shell-heaps at McFarland's Cove, on John's Bay in the town of Bristol, on the coast 1 to 6 feet deep, with other stone implements and pottery. Deposit accidental. Also one water-worn implement found on the beach near shell-heap. He has explored the shell-heaps of the county, and

found more of these kind of implements than perfect ones. He has never found any stone tools in or near the shell-heaps that he thought were deposited or buried with human remains, but Mr. Phelps and himself took from a deposit, which was found four miles from the salt water, about one hundred and fifty stone tools of different kinds, all perfect and some very nicely finished. They were mostly celts and spear-heads. Of the five rude implements which he sent four are paleolithic. Accession 20251; catalogue Nos. 139151, 139152.

Aug. C. Hamlin, Bangor, Maine, February 18, 1888. Has no rude implements and knows of none. Thinks he has seen a few similar, but believes them to have been of recent date.

J. L. M. Willis, Eliot, Maine, February 16, 1888. Has five rude implements. One from New Jersey, two from North Carolina, and two from Newbury, Massachusetts. (One of argillite, two of quartz, two of fine granite.)

Joseph Wood, Bar Harbor, Maine, February 7, 1888. Has four rude implements. Gives drawings in outline. No. 1 from Stoneham, Massachusetts; Nos. 2, 3, and 4 from Bar Island, Bar Harbor, Maine.

E. M. Goodwin, Hartland, Vermont, March 1, 1888. Has six or more. Sends outline drawings. Nos. 1 and 3 are flint found on the surface at Fairfield, Indiana. No. 2 is a dark flint found on the surface in Tennessee. No. 4 is of brown flint found on the surface near a mound in Illinois. No. 5 is white quartzite found on the surface near a system of earth-works in Missouri. Other relics were found in close proximity. No. 6 is a fragment of a polished implement of porphyritic stone found in a mound in Fairfield, Indiana, associated with arrow and spear-points, and stone ornaments.

John M. Currier, Newport, Vermont, February 8, 1888. He has gathered these implements in Castleton, Monkton, New Haven, and Lincoln, in Vermont. Nearly all have been donated to the University of Vermont, Vermont Historical Society, and to the Smithsonian Institution. Material, Hudson River limestone, quartzite, and jasper. Those of gray quartzite are the most common, next the Hudson River limestone, and black marble. They are found on the surface. Has found some from one-half to six inches in diameter.

Prof. Henry W. Haynes, 239 Beacon street, Boston, Massachusetts, February 15, 1888. Has a collection of paleolithic implements; 23 from Trenton, New Jersey (five his own find), Dr. Abbott; 2 from Allentown, Pennsylvania (A. F. Berlin), quartzite; 1 from Millbank, Tennessee (A. F. Berlin); 16 from Little Falls, Minnesota (Miss Babbitt), quartz; 10 from eastern Massachusetts (his own find), white quartz; 10 from northern New Hampshire (his own find), white quartz; 1 from Bar Harbor, Maine (his own find), white quartz; 1 from Perkins County, Georgia (his own find), white quartz; 30 from Wakefield, Massachusetts (his own find), brown felsite; 20 from eastern Massachusetts (his own find), brown felsite; 25 from Moosehead Lake, Maine (his own find) green felsite, speckled with white quartz; 4 from Plattsburgh, New York (Dr. D. S. Kellogg); 7 from Washington, District of Columbia (his own find), yellow, quartzite; 1 from Saguenay, Lower Canada; 1 from Castine, Maine (N. S. True), fine grain argillite; 10 from Burlington, Vermont (own find), pink quartzite; atotal of 162.

The green felsite speckled with white quartz, from Moosehead Lake (twenty-five specimens), is the same material of which most of the Indian implements are made, which he found in the shell-heaps in the southeastern part of Maine, at Frenchman's Bay and elsewhere. Has described his white quartz implements in *Proc. Boston Soc. Nat. Hist.*, February 1, 1882, vol. XXI, p. 382. Many of these were found in "hard pan" or glacial till, 3 or 4 feet below the surface, and where no Indian implement could be found. But has found some associated with Indian implements. Their deposit seems to have been always accidental.

Professor Haynes, of Boston, read a paper, February 1, 1882, before the Boston Society of Natural History, vol. XXI, page 382, in which he reports the finding of similar implements in various localities in New

Hampshire, Vermont, and Massachusetts. He enlarges (and very properly to) upon his extended experience with the paleolithic implements of the world. He expresses, without hesitation or doubt, that these implements were the intentional work of man; that they were not made by, nor did they belong to the Indian of that country. He says, page 385:

But no such traces of Indian occupation has the most painstaking investigation revealed to me in many places where I have found the new types of rude implements in considerable quantities.

Again, page 388:

It will be noticed that all of these rude and simple tools have been fabricated out of the hardest, heaviest, toughest kinds of rocks that the region where they are found can furnish. They are commonly made of white or milky quartz, or quartzite, felsite, or of some very compact variety of syenite or granite. Often they have been fashioned out of a pebble from the glacial drift, which still retains a portion of its original surface or crust. This circumstance proves that they must necessarily be post-glacial in date, whether they have been found deeply bedded in the earth or upon the surface of ploughed fields.

Professor Haynes sums up his argument:

I infer the former existence in New England of a race of men different from and less advanced than the Indians, because I have found in many localities, where none of the ordinary traces of Indian occupation could be discovered, a large quantity of stone implements of ruder types and coarser make than those habitually used by them. Whether these are actual relics of primeval man, *i. e.*, of a race who lived long anterior to the Indians, or whether they are the work of the degraded descendants of an earlier people who had succumbed to the Indians, I do not undertake to pronounce.

The difference between Professor Haynes and myself is that he is unwilling to attribute these implements to a paleolithic period. He insists that to be evidence of this the implements in question should be found in the river gravels, or in a corresponding geologic stratum. I know that in many countries where the existence of a paleolithic period is undoubted, the implements (principally Chellian or of the earliest epoch) have been found on the surface, and they are identified as such, by comparison with others found in the river gravels. My experience with these implements in the two continents justifies me in identifying those found in America as belonging to the same stage of culture to which the Chellian implement of France and England belonged, and, consequently, enables me to call them paleolithic implements.

James J. H. Gregory, Marblehead, Massachusetts, February 6, 1888. Has found *caches* containing half a peck one foot below surface.

J. F. Frisbie, M. D., Newton, Massachusetts, February 16, 1888. Has none. Newton Natural History Society has a few. They are found quite abundantly in this vicinity. Many Indian relics found in this city and adjoining town—Watertown.

Samuel Henshaw, Boston, Society Natural History, Berkeley street, Boston, Massachusetts, February 9, 1888. Has no rude implements. "Our collection was presented to the Museum of American Archaeology and Ethnology at Cambridge in 1867."

Samuel A. Green, Massachusetts Historical Society, 30 Tremont street, Boston, Massachusetts, February 14, 1888. Has a collection of rude implements, found at Groton and along the bank of the Nashua River.

E. J. Rockwood, Worcester, Massachusetts, February 27, 1888. Has no rude implements. Will spend next summer examining the valley of the Connecticut River near Mount Holyoke, and if successful will send specimens.

Jesse Fewkes, post-office box 509, Newton, Massachusetts, February 18, 1888. Has two hundred rude implements chiefly from Essex and Middlesex Counties, Massachusetts. Has many from shell mounds. Speaks of grooved ax found in moraine-deposit.

Frank A. Bates, Boston, Massachusetts, February 23, 1888. Has no rude implements, and refers to F. A. Adams, 233 State street, Boston, Massachusetts.

F. A. Adams, Boston, Massachusetts, February 23, 1888. Response received May 21, 1889. Has about five hundred specimens; about one-fifth are perfect arrow and spear heads, of porphyry, quartz, flint, obsidian, agate, etc., from Concord and Plymouth, Massachusetts, and various States of United States; deposits accidental, and found on or near the surface, associated with other neolithic implements.

MEM.—It is evident that this gentleman, like some others, has mistaken the implements inquired about, and so has misapprehended the questions.

Irving Holcomb, West Granby, Connecticut, February 8, 1888. Has five. Found a nest or *cache* containing a peck, 3 by 7 by $\frac{1}{4}$ inches, 2 feet under ground. Such as described in Abbott's *Primitive Industry*, page 195.

Irving Holcomb, West Granby, Connecticut, February 15, 1889. * * * "The rude stone implements I wrote about were found as follows: One on the bank of Salmon Brook, in the town of Granby, Connecticut. The specimen is of flint, and was found on a terrace. All other chips and unfinished specimens I have were found on the surface in plowed fields—all in different places. I have one rare specimen which is finished and was found about 12 feet below the surface nicely packed in with about twenty others of same shape, but different sizes, near Salmon Brook, on a place where arrow-heads were made." Has but one, which he bought.

G. L. Faucher, West Winsted, Connecticut, February 9, 1888. Has none and knows of none. Will explore the State in the spring and will notify us if he finds anything.

Rev. Jeremiah Zimmerman, Syracuse, New York, February 15, 1888. No information.

Rev. W. M. Beauchamp, Baldwinsville, New York, February 7, 1888. Has a collection. Will answer more fully later.

J. H. Norton, Plainville, New York, March 2, 1888. Has about two hundred, all of chert; found on the surface in Onondaga, Cayuga, and Oswego Counties. Has twenty-eight implements from a *cache* of fifty turned up by the plow. None in mounds. Deposit accidental.

Dr. Julius Pohlman, Museum Natural Science, Buffalo, New York, February 7, 1888. Has none in the museum and knows of none in the vicinity.

Edgar J. Klock, East Schuyler, New York, April 2, 1888. Has very few, in fact but one that is well defined, which he obtained from J. R. Nissley, Ada, Ohio.

Prof. Frederick Starr, Auburn, New York, June 26, 1888. Has one rude implement of argillite, found on the banks of the Delaware River, eastern Pennsylvania, 7 miles above Easton, near mouth of Martin's Creek. Probably a surface find. Arrow-heads of same materials and much affected by weather are not uncommon there.

D. S. Kellogg, M. D., Plattsburgh, New York, February 14, 1888. Has many rude and unfinished implements, but none that he considers as real paleoliths. None found in river drift. Can duplicate all our specimens.

George R. Howell, Albany, New York (no date). Has none, but thinks there are some in the New York State Museum in Albany. We should apply there.

C. M. Boughton, East Schuyler, New York, February 16, 1888. Has no collection, having sold it. But he has found these specimens in different places in the western part of this State. Will collect specimens if we wish from a sand-hill near.

Norman Cole, Glens Falls, New York, February 6, 1888. Has two hundred from this vicinity. In the valley of the upper Hudson, foot of Adirondacks, and near shores of lakes and streams.

James Angus, West Farms, New York City, February 10, 1888. Has *some* rude and unfinished implements from West Chester County, New York, and some from New Jersey. Gives large outline drawings.

C. H. Chapman, 364 and 366 Broadway, New York, February 14, 1888. Has none. Mr. J. Harris, Waynesville, Ohio, has them.

Arthur Hollick, recording secretary Torrey Botanical Club, Columbia College, New York City, February 15, 1888. Has none.

Natural Science Association of Staten Island, New Brighton, New York, February 16, 1888. No rude implements. Do not know of any having been found in this county; all thus far discovered belong to the shell-mounds.

Dr. C. C. Abbott, Trenton, New Jersey, but written at Cambridge, Massachusetts, February 15, 1888. (Answers for Professor Putnam.) Has thousands of implements of paleolithic character from various localities. Has the Abbott Collection from the Trenton gravels, but can give no approximation as to number. Would take a month to make a list.

Samuel Jackson, Freehold, New Jersey, March 19, 1888. His collection is in the Peabody Museum at Cambridge. Has three specimens like No. 10086—Utah, several like No. 5931—Maryland; found under the roots of a tree 18 inches deep in Monmouth County,—possibly a *cache*. He mentions a find containing a large number of specimens standing perpendicular and arranged in circles. One or two of these are in the Lockwood Collection at Cambridge, Massachusetts.

Frank D. Andrews, Vineland, New Jersey, February 18, 1888. Has found many of hornstone in Schoharie County, New York, but has sold his collection. Will try and collect some this summer.

Robert H. Engle, Moorestown, New Jersey, February 20, 1888. Has fifty. Material greenstone and quartz. Found on the surface in Watauga County, North Carolina, Burlington County, New Jersey, Summit County, Ohio, and Davidson County, Tennessee. Collection packed up; when unpacked will send duplicates.

Andrew Sherwood, Mansfield, Pennsylvania, March 27, 1888. Can not say how many rude implements he has in his collection. Writes about the "Puzzling Cobbler."

T. M. Nesbit, Lewisburgh, Pennsylvania, June 20, 1888. Has a great many rude stone implements of flint, found in the drift and boulder clay.

A. F. Berlin, Allentown, Pennsylvania, February 11, 1888. Has twelve, eleven of quartzite, one of yellow jasper; found on the surface in the city of Reading, Pennsylvania, on the banks of the Schuylkill, on islands, and five or six from Allentown, Pennsylvania. See article in *American Antiquarian*, vol. I, No. 1, page 10, and article by Dr. W. J. Hoffman, *American Naturalist*, Vol. XIII, No. 2, page 108.

S. S. Rathvon, Lancaster, Pennsylvania, March 22, 1888. Has about three hundred and fifty, including all kinds. Material gray quartzite, white quartz, chert, jasper, hornstone, etc. Found along the banks of the Susquehanna and Conestoga Rivers and adjacent creeks and in plowed fields. Also found with fragments and chips, as if there had been places of manufacture. Have been described in the *Transactions of the American Philosophical Society*, 1878, pages 351-368.

G. W. Brodhead, Water Gap House, Delaware Water Gap, Pennsylvania, February 10, 1888. Has a number of hornstone, chert, yellow and brown jasper, silicious slate, and white quartz; found north and south of the Gap, always in the valley and on the surface. None found in mounds. Hornstone is found 1 and 2 miles north of Water Gap in a bed of Oriskany sandstone, yellow and brown jasper, from quarry near Easton, 24 miles south. Franklin Peale used to gather them twenty years ago.

H. L. Simon, Lancaster, Pennsylvania. Has a collection, but it is packed up. The material is flint and jasper; found on the surface at Mill Creek and Tumbury (?) Hill, on Susquehanna River.

Charles H. Stubbs, M. D., Wakefield, Pennsylvania. Has twenty-four. Sent *many* to Lehigh University, Pennsylvania. Peter Hiller, Conestoga Center, Lancaster County, has a collection. Material trap rock and sandstone; found on the surface at Caldwell's Island, Susquehanna River, and near Gap, in Lancaster County.

Oliver D. Schock, Hauburgh, Pennsylvania, April, 1888. No information.

G. S. Lamborn, Liberty Square, Pennsylvania, February 9, 1888. Has seven specimens of hard brown sandstone, black trap, quartzite, gray and black jasper. Surface finds from the banks of rivers and in plowed fields. No duplicates.

George S. Lamborn, Liberty Square, Pennsylvania, February 7, 1889. Since writing last has come in possession of a stone implement—very hard—of ash color, with small end somewhat broken. Inclosed a sketch. The dotted lines were probably the original edge, tolerably sharp. The outside lines were drawn looking at it the broad way; the inside are looking against the edge. The sketch is full size. He has never before seen one like it. It was found at McCall's Ferry, Lancaster County, Pennsylvania.

Rev. W. M. Taylor, Mount Jackson, Pennsylvania, April 12, 1888. Has but few rude implements. Will look for some this summer.

Norman Spang, Etna, Pennsylvania, February 6, 1888. Has had many hundreds.

F. W. Brown, Glen Rock, Pennsylvania, February 7, 1888. Has none and knows of none.

C. John Hexamer, 419 Walnut street, Philadelphia, Pennsylvania, February 7, 1888. Has none.

S. H. Zahm, Lancaster, Pennsylvania, February 27, 1888. Has six hundred rude implements, principally of gray stone or trap rock, white quartz, jasper, and flint, found on the banks of the Susquehanna River and in plowed fields in Pennsylvania and Maryland, and in Florida on the banks of a lake, associated with arrow and spear points, axes, etc. Deposit seemed accidental. Has some which he would exchange for objects not in his collection.

George H. Clapp, Pittsburgh, Pennsylvania, February 7, 1888. Has thirty of argillite and flint, found on the surface in the Ohio River Valley, 13 miles below Pittsburgh, associated with chips and finished arrow and spear heads. Deposit seemed accidental.

I. S. Geist, secretary Natural History Lyceum, Marietta, Pennsylvania. (No date.) Has none.

J. D. McGuire, Ellicott City, Maryland, February 9, 1888. Has about three hundred of quartz or quartzite, found on the Eastern Branch Potomac River, District of Columbia; Patapsco River near Relay, Baltimore and Ohio Railroad, Maryland; South River Neck, Anne Arundel County, Maryland, and a few from his farm, Howard County, Maryland. Found on surface at high flood-line of these streams. Has a *cache* of twenty from Anne Arundel County. Ten feet away was another *cache*. One *cache* of one hundred; one of twenty-six. All of the *cache* implements found near oyster-shell heaps.

MEM.—May not these belong to the prehistoric man who made the shell heaps? There are believed to have been two epochs of prehistoric culture represented in the kjoekonmoddings of Denmark. The shell heaps of America should be carefully examined for evidences of paleolithic man or for an earlier epoch than the neolithic period.

O. N. Bryan, Marshall Hall, Maryland, February 23, 1888. Sent a large number to the Smithsonian Institution last spring.

E. Stanley Gary, Baltimore, Maryland, February 6, 1888. No information.

Otis Bigelow, Avenel, Maryland, February 8, 1888. Has already deposited his collection in the Smithsonian Institution. Knows of workshop on the Mattaponi in Guineys, Caroline County, Virginia.

Alexander C. Black, Army Medical Museum, Washington, District of Columbia, February 10, 1888. Has none. Has given all his specimens to the Smithsonian Institution. All were surface finds from Randolph County, Indiana. Never found in mounds.

Albert S. Gatchet, Washington, District of Columbia, February 7, 1888. Has none. Sends lists of museums in Switzerland.

Dr. H. C. Yarrow, Washington, District of Columbia, February 6, 1888. Has sent his circular to William Hallet Phillips, esq., of Washington.

John J. Hayden, 1325 K street, Washington, District of Columbia. No collection.

George H. Moran, M. D., Morgantown, North Carolina, February 23, 1888. Has none, but could find. Will seek. Has sent objects—"Gila monster"—to Professor Baird.

G. B. Lartique, M. D., Blackville, South Carolina, February 11, 1888. Has none.

S. E. Babcock, Chester, South Carolina. Has none.

J. C. Neal, M. D., Archer, Florida, February 10, 1888. Has twenty or more specimens of stone darts. A mound was opened on Tallapoosa River, farm of William R. Jordan, by a freshet. Large quantities of pottery, skulls, implements, etc., of silver and bronze were found.

Prof. N. T. Lupton, Auburn, Alabama, March 12, 1888. Has none.

C. M. Luttrell, Oxford, Alabama. Has none. A private collection at Taladega, Alabama, is for sale; owner dead.

J. P. Stelle, Mobile, Alabama, March 19, 1888. Does not know of any rude implements. Has lately been along the Gulf coast in Baldwin County, Alabama, and found the region very rich in aboriginal remains; two or three different races seem to be well represented. There are many large mounds, none of which seem to have been explored. The finest pottery he has yet met with is there; light and well baked.

Prof. G. F. Wright, Oberlin Ohio. Has four from Dr. Abbott.

E. T. Nelson, Delaware, Ohio. Has six hundred rude implements of flint; a large proportion were found in a single pocket or *cache* near the dividing line of Knox and Coshocton Counties in this State.

M. C. Read, Hudson, Ohio, February 7, 1888. Found about seventy-five mingled with animal bones and fragments of pottery in a rock shelter in Boston township, Summit County, Ohio. See Smithsonian Institution Report 1879, page 439.

G. W. Hornisher, Camden, Ohio, February 14, 1888. Has several paleolithic implements; never counted them; material, chert; found on the surface along the east branch of White Water River.

D. F. Appy, Granville, Ohio, April 28, 1888. Has sixty-three rude implements of flint or hornstone; found mostly on the surface in Licking County, but have found twenty-two in mounds within a radius of 4 miles of this place.

MEM.—But these are not paleolithic.

S. M. Luther, Garrettsville, Ohio, March 5, 1888. Has sixty rude implements, chiefly of chert; a few of quartzite; nearly all found on the surface. There are quite a number of what Dr. Abbott terms "Turtlebacks." All found within a radius of 20 miles of this place.

Henry W. Hope, Paint post-office, Ohio, June 5, 1888. Has twenty rude implements of flint or other fine-grained stone; found on the surface in Highland County, Ohio, and not associated with any other relics.

Robert Clarke, Cincinnati, Ohio. Has none.

J. F. Henderson, Newville, Ohio, March 15, 1888. Has no information.

W. M. Cunningham, Newark, Ohio, April 10, 1888. Has twenty-five rude implements, principally of flint; found on the surface and in mounds or earth-works in Licking County, Ohio, associated in some cases with arrow and spear points, axes, etc. Deposits apparently both accidental and intentional. Collection not in shape for exchanges.

John P. McLean, Hamilton, Ohio, February 23, 1888. Has a few of dark blue chert; found on the surface in Butler County, Ohio. In section 24, Hanover township, of this county, is a field where great numbers have been found. "If you request will try and find some more."

Dr. W. B. Rosamond, Milnersville, Ohio, February 10, 1888. He will send fifty or seventy-five found here on the surface. Will exchange for publications.

George W. Deau, Kent, Ohio, February 8, 1888. Has thirty-one rude implements of chert, from 3 to 4 inches in length by $1\frac{1}{2}$ to $2\frac{3}{4}$ in width by $\frac{1}{2}$ to 1 inch in thickness. From Trumbull, Portage, and Summit Counties, Ohio.

Dr. Herbert Twitchell, Hamilton, Ohio, March 23, 1888. Has nothing paleolithic. Sent tin-type of large spear-head.

A. P. Pease, Massillon, Ohio, March 24, 1888. Has ninety rude chipped implements of colored chert, varying in length from 2 to 5 or 6 inches, given him by farmers who plowed them up. Can exchange twenty for publications on this subject. Expects to get a *cache* of flints, found while digging a ditch. He has the largest private collection in this county (Stark), numbering over one thousand specimens, which he will sell for \$500 cash.

I. H. Harris, Waynesville, Ohio, February 11, 1888. Has two or three hundred "*chips* and unfinished implements." All from Fort Ancient.

R. T. Manning, Youngstown, Ohio, March 5, 1888. Has twelve rude implements of flint; found in southern Ohio.

James H. Smith, Licking County, Pioneer Historical and Antiquarian Society, Newark, Ohio, February 8, 1888. Has none and knows of none.

Horace P. Smith, custodian Cincinnati Society of Natural History, 108 Broadway, Cincinnati, Ohio, April 10, 1888. Has but a small number of these implements in the collection. Cannot be sent for verification without the action of the executive board of the society.

John H. Lemon, New Albany, Indiana, February 14, 1888. Writes from Escondido, California. Has one hundred paleolithic implements of white, red, and gray flint; found on the surface near falls of the Ohio.

T. L. Dickerson, Fairfield, Indiana, February 13, 1888. Has many of these rude implements of chert, sandstone, sometimes of bastard granite, and striped slate: found on the surface near springs, camp sites, etc., and associated with broken implements and chips, indicating shops and manufactories. Deposit accidental, except where *cached*.

E. L. Guthrie, Adams, Indiana, February 20, 1888. Has a few very fine specimens (not paleolithic), found on the surface in this county (Decatur), Indiana. Sends many tracings of fine implements. Will not part with them—but gladly loan for comparison.

William W. Borden, New Providence, Indiana, March 23, 1888. Has quite a large collection of stone implements of various kinds. Has purchased several cabinets. Has the collection of the late Dr. James Knapp, of Louisville, Kentucky. Will forward some specimens soon.

C. S. Arthur, Portland, Indiana, March 20, 1888. Has seventy-five of flint; found on the surface in different localities in Jay County. A nest, or *cache*, of sixty were uncovered by the plow about 5 miles from here. Another lot was found in Adams County, buried in sand. They have never been described.

E. Pleas, Dunreith, Indiana, February 10, 1888. Has one hundred rude implements. Can spare thirty or forty from Van Buren County, Arkansas, and thirty from Henry County, Indiana.

Charles H. Bryan, Muncie, Indiana, February 9, 1888. Has a number found on the surface in Logan and Hancock Counties, Ohio, and Jay County, Indiana. Has some like No. 768 and No. 8904. Could collect fifteen or twenty specimens to send. Has some which he will give.

John W. Linck, Madison, Indiana, February 17, 1888. Don't know anything about paleoliths, but Jesse Wagner has a petrified head of a buffalo.

William Robertson, Farmland, Indiana, March 20, 1888. Has over one hundred, mostly of granite; found on the surface in Randolph County, Indiana.

MEM.—Surely not paleolithic.

D. A. K. Andrus, Rockford, Illinois, February 7, 1888. Has none and knows of none.

George E. Sellers, Bowlesville, Illinois. (No date.) The rude unfinished implements are very abundant in southern Illinois, more so in the more recent out-door workshops than in the mounds or the shops connected with them, and, in most cases, appear to be modified cores.

Dr. Merit L. Saunders, Thompson, Illinois, February 8, 1888. Will send arrow-points, chips, etc.

H. S. Hackman, Peru, Illinois, February 26, 1888. Has but few. His collection consists of higher finished implements. Has a steel spear found in a mound. Believes discoidal stones were used as mortars—has one with pestle fitting in it.

R. T. Miller, South Bend, Indiana, March 9, 1888. Has about one hundred rude implements; found on the surface near this place, in isolated localities. Sends photograph of image carved from gray sandstone.

C. L. Obst, Pittsfield, Illinois, March 20, 1888. Has a few rude implements of white and pink flint and jasper. Surface finds. Ten years ago found one of them in a drift-bed not less than 75 feet in height, in Calhoun County, Illinois. Never found any in mounds, tombs, Indian graves, or ancient structures of any kind.

George Newcomer, Franklin Grove, Illinois, March 2, 1888. Has twenty-four rude implements; twenty of white chert found on the surface in Whiteside County, and four of quartzite from Carroll County, Illinois.

John Brady, Aledo, Illinois, February 11, 1888. Has forty-five paleolithic implements of flint, some of which are light colored, others are blue and gray; found on the surface in Mercer County, Illinois.

E. H. Hamilton, Petersburg, Illinois, February 22, 1888. Has forty or fifty rude implements of white, yellow, and dark blue flint; found on the banks of the Sangamon River, associated with flint chips, broken pottery, etc. Identical with Nos. 5900, 9767, 11535.

William McAdams, Alton, Illinois, February 12, 1888. Has a number; found in river gravels alongside of Devonian and Silurian fossils.

John B. Tscharnier, Champaign, Illinois, Feb. 11, 1888. Has six rude implements of white and dark flint; found on the surface in Washington County, Illinois, associated with flint arrow and spear points. Deposit seemed accidental.

D. F. Hitt, Ottawa, Illinois, February 27, 1888. Has very few; never thought them worth saving.

M. Tandy, Dallas City, Illinois, March 19, 1888. Has three rude implements of flint and others of various kinds, amounting to twenty-five specimens; found on the surface in this vicinity. Has, with very few exceptions, sent all the results of his collecting to the Smithsonian Institution.

Lawson S. Bliss, Dallas City, Illinois, February 13, 1888. Has a number of rude and unfinished implements. Has a large collection of arrow and spear heads, stone axes, etc. Is adding to his collection with intent to present to the Smithsonian Institution. Look at Mr. Tandy's collection already presented. Many mounds here.

James Shaw, Mount Carroll, Illinois, February 10, 1888. Has sent rude specimens to the Smithsonian Institution. Will send more in the early spring and summer.

W. H. H. King, Jacksonville, Illinois, April 25, 1888. Has one hundred implements of chert; found mostly on the surface in Morgan, Calhoun, and Pike Counties, Illinois. Forty specimens were taken out of a pocket or *cache*.

Dr. J. F. Snyder, Virginia, Illinois, April 30, 1888. Has nearly one hundred rude implements of white flint, found on the surface in Cass County, Illinois; also about thirty rude flints from Schuyler County, Illinois, and eight specimens somewhat resembling the District of Columbia specimens figured, of black slaty quartzite, plowed up in one deposit. Several flints from Saint Clair County, Illinois; ten of white cherty quartzite from Pettis County, Missouri; fifteen from Jefferson County, Missouri; eighteen of brown vitreous flint from Travis County, Texas; nine of pink and white novaculite from Garland County, Arkansas.

John E. Younglove, Bowling Green, Kentucky, February 9, 1888. Has twenty or twenty-five rude implements principally of blue flint, found in this region on the

surface, not in mounds. They are not regarded as valuable. Gave Professor Ward, of Rochester, forty specimens. Sends photograph of human bone (femur) pierced with flint arrow; highly interesting specimen.

J. G. Cisco, Jackson, Tennessee, February 9, 1888. Has twenty implements of gray quartz, most of them found on the surface (a few from mounds) in Madison County, Tennessee.

Benjamin F. Bush, Grand Blanc, Michigan, February 18, 1888. Has many pieces like illustrations in circular 36.

Miss F. E. Babbitt, Coldwater, Michigan, February 21, 1888. Has a large number of specimens which are misplaced or lost. Material, quartz. They are found in the gravels at Little Falls, Minnesota. Will try and get some this summer.

F. C. Clark, A. B., 42 Madison street, Ann Arbor, Michigan, February 15, 1888. Has some rude stone implements resembling those in circular 36. One from sand and gravel pit 12 feet under the surface, looks like "bath brick" rudely flaked. Studied archaeology for ten years under Professor Winchell.

R. H. Tremper, M. D., Albion, Michigan, February 9, 1888. Has about one hundred and fifty rude implements.

N. Y. Green, Battle Creek, Michigan, March 16, 1888. Has twenty rude implements of flint, slate, and a kind of sandstone or sandy slate. All found on the surface in that locality. Drift formation.

Charles E. Barnes, Lansing, Michigan, January 9, 1888. His collection is boxed at Battle Creek. Has not seen it for four years.

C. L. Mann, 27 Erie street, Milwaukee, Wisconsin, February 6, 1888. All our collections contain them, but they are considered of small value. Has forty or fifty copper implements for sale. Will send photographs. They were uncovered by a storm—cyclone.

E. L. Brown, Durand, Wisconsin, February 17, 1888. Has one of bluish hornstone; found on the surface. He knows a Methodist preacher who has a collection of seventy-five. Does not know where he is. They were plowed up and said to have been placed on their edges close together.

W. M. Wheeler, Milwaukee, Wisconsin, May 4, 1888. Custodian of Public Museum. Has twelve rude implements of flint in the Museum collection. Surface finds. Will not part with any.

John Hume, Eglington Place, Davenport, Iowa, February 25, 1888. Wants more time to examine the authorities.

Thomas J. Tidswell, Independence, Missouri, April 2, 1888. Has thirty rude implements of dark blue and gray flint; found on the surface in Jackson County, Illinois, associated with scrapers, perforators, hammer-stones, arrow-points, etc. Deposit seemed accidental. Will send twelve or fifteen.

Charles J. Turner, Brunswick, Missouri, March 20, 1888. Has a few mostly of flint. Some from mounds, some from the surface.

George J. Engelman, M. D., 3003 Locust street, St. Louis, Missouri, February 7, 1888. Has a large number of rude implements of red brownstone similar to porphyry. Surface finds from southeast Missouri. Deposit accidental. No one values them.

Sid J. Hare, C. E., Kansas City, Missouri, April 1, 1888. Has twenty rude implements of flint; found on the surface, in plowed fields, associated with arrow-points and stone axes, in the vicinity of Kansas City. Deposit seemed accidental. None found in mounds. Will send specimens next fall.

G. C. Broadhead, Columbia, Missouri, February 9, 1888. Has twenty of white chert, hematite, and porphyry. Surface finds from Missouri, Kansas, and Texas. Will not part with them.

W. Albert Chapman, Okolona, Arkansas, February 13, 1888. Has fifty points, from crude to perfect, also masses of chipped material, such as hornstone, flint, lydian stone, jasper, transparent quartz, quartz (various shades of white) gneiss, and mica schist. The specimens were found on the surface and down to 6 feet below, singly, and associated with chippings, broken and unfinished points, and other tools or im-

plements, in Clark, Nevada, Pike, Howard, Sevier, Polk, Hot Springs, and Montgomery Counties, Arkansas.

R. R. Smith, Fordyce, Arkansas. Has several dozen of rude and unfinished implements of flint of various colors. Found on the surface all over the country, but mostly near creeks and rivers, and also in mounds. Other objects found with them.

J. L. McInnis, College Station, Texas. Gives no information.

Dr. H. H. Thorpe, Liberty Hill, Texas, February 11, 1888. Has none. Has heard of but never gathered them. Has some mound relics which he will forward.

Stephen Bowers, San Buenaventura, California, April 18, 1888. Has fifty of chert, quart, agate, jasper, chalcedony, obsidian, porphyry, and basaltic rocks; found on the surface on old village sites, and sometimes buried with mortars, pestles, bowls, pipes, spear-points, and shell and bone implements. Only occasionally deposited with the dead.

Mrs. R. F. Bingham, corresponding secretary of the Society of Natural History, Santa Barbara, California. Has none and nothing similar. Has mortars, arrows, etc., found in graves—here and on adjacent islands.

H. F. Emeric, auditing department, Wells-Fargo Express, San Francisco, California, February 24, 1888. Has no collection. Knows the implements; material black flint; found all over California.

E. J. M. Knowlton, Big Lake County, Minnesota, February 20, 1888. Has nothing.

William Middagh, Rollag, Minnesota, March 6, 1888. Has nothing.

George W. Seymour, Taylor's Falls, Minnesota, February 16. Has none, but knows of mounds in his neighborhood which could be opened.

A. F. Davidson, Croston, Oregon, April 8, 1888. Has nothing.

William Cuppage, Winfield, Kansas, February 23, 1888. Has no rude implements. Sent his collection of stone implements to his sister in Ireland and his last copper ax to the Smithsonian Institution.

A. R. Bodley, Ohio Township, Franklin County, Kansas. Has two hoes and a pestle; nothing else. They are now in the University, Ottawa, Franklin County, Kansas.

T. M. Shallenberger, Bradshaw, Nebraska, February 9, 1888. Has very few of paleolithic type. Will forward in time what he has and agree upon exchange.

Clark F. Ansley, Lincoln, Nebraska, April 20, 1888. Has forty rude implements of clear quartz, flint, and greenstone.

Lewis A. Kengla, M. D., Tucson, Arizona, March 29, 1888. Letter of this date refers to collections from the District of Columbia which was left at his father's house. Can give no information as to numbers.

E. L. Berthoud, Golden, Colorado, March 6, 1888. Has seven implements from his neighborhood. Sent some to the Smithsonian Institution.

A. L. Siler, Ranch, Utah, February 21, 1888. Has none.

David Boyle, curator of museum, Canadian Institute, Toronto, Canada, February 8, 1888. Has one hundred rude implements of chert; found all over the province from 8 to 10 inches below the surface associated with implements of a more highly finished type. Can not send specimens. Refers to writer's report in the printer's hands.

SECTION IV.

BIBLIOGRAPHY OF THE U. S. NATIONAL MUSEUM DURING
THE FISCAL YEAR ENDING JUNE 30, 1888.



BIBLIOGRAPHY OF THE U. S. NATIONAL MUSEUM DURING THE FISCAL YEAR ENDING JUNE 30, 1888.

I.—PUBLICATIONS OF THE MUSEUM.

Volume IX of Proceedings of the U. S. National Museum is noticed in the bibliography of the report for 1887. The greater part of the edition was not, however, printed until August in that year.

The following is a list of signatures of the Proceedings of the U. S. National Museum, published during the year and forming part of volume X:

Date of publication.	Signature number	Pages.	Date of publication.	Signature number.	Pages.
July 2.....	7	97-112	Aug. 3.....	20	306-320
2.....	8	113-128	Sept. 16.....	21	321-336
2.....	9	129-144	16.....	22	337-352
2.....	10	145-160	29.....	23	353-368
2.....	11	161-176	29.....	24	369-384
2.....	12	177-192	Nov. 3.....	25	385-400
2.....	13	193-208	3.....	26	401-416
2.....	14	209-224	3.....	27	417-432
2.....	15	225-240	3.....	28	433-448
Aug. 1.....	16	241-256	Jan. 6.....	29	449-464
1.....	17	257-272	6.....	30	465-480
3.....	18	273-288	6.....	31	481-496
3.....	19	289-305	Total.....	25	400

During the last five months of the fiscal year no signatures appeared. Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | The Operations, Expenditures, and Condition | of the Institution | to | July, 1885. | — | Part II. | — | Washington: | Government Printing Office. | 1886. |

Pp.-xi+264; vii+939. Constituting a report upon the United States National Museum for the half-year ending June 30, 1885; together with a paper entitled "The George Catlin Indian Gallery in the U. S. National Museum," by Thomas Donaldson.

The following numbers of the Bulletin of the U. S. National Museum appeared during the year:

Department of the Interior: | U. S. National Museum. | — | Bulletin | of the | United States National Museum. | No. 32. | Catalogue of
H. Mis. 142, pt. 2—45

Batrachians and Reptiles | of Central America and Mexico. | by |
E. D. Cope. | — | Washington: | Government Printing Office. |
1887.

Pp. 98. 8vo.

Circular No. 36 was published during the fiscal year. It bears the following title:

No. 36. Circular concerning the Department of Antiquities.

One page, 17 figures. 8vo.

II.—PAPERS BY OFFICERS OF THE NATIONAL MUSEUM AND OTHER INVESTIGATORS WHOSE WRITINGS ARE BASED DIRECTLY OR INDIRECTLY ON MUSEUM MATERIAL.

ALPHABETICAL LIST OF NAMES.

	Page.		Page.
Allen, J. A.	707	Kidder, J. H.	715
Atwater, W. O.*	707	Knowlton, F. H.*	715
Baird, Spencer F.	707	Koehler, S. R.*	716
Ball, E. M.	707	Kunlien, Ludwig	716
Bartlett, Edward.	707	Lilljeborg, W.	716
Bean, Tarleton H.*	707, 708	Linton, Edwin.	717
Beckham, Charles Wickliffe*	708	Lucas, F. A.*	717
Bendire, Charles E.*	708	Mason, Otis T.*	717
Beyer, H. G.*	708	McDonald, Marshall.	711, 712
Bollman, Charles H.	708	McNeill, Jerome.	717
Brewster, William.	708	Merrill, George P.*	717, 718
Butler, Amos W.	708	Merrill, J. C.	718
Clark, A. Howard*	708, 709	Nelson, Edward W.	718
Clarke, F. W.*	709	Palmer, William*	718
Coale, Henry K.	709	Pelseneer, Paul.	718
Collins, Joseph W.*	709, 710	Rathbun, Richard*	719
Cope, E. D.	710	Rau, Charles*	719
Cory, Charles B.	710	Richmond, Charles W.	719
Coues, Elliott.	710	Ridgway, Robert*	719-721
Dall, William Healey*	710, 711	Riley, C. V.*	721-724
Dewey, Frederic P.*	711	Scott, W. E. D.	724
Donaldson, Thomas.	711	Sudder, Newton P.*	724
Dutcher, William.	711	Seeböhm, Henry.	724, 725
Earl, R. Edward*	711, 712	Sennett, George B.	725
Eigenmann, Carl H.	712	Sharpe, R. Bowdler.	725
Elliott, D. G.	712	Shufeldt, R. W.	725-727
Fisher, A. K.	712	Simpson, Charles T.	727
Gilbert, C. H.	712	Smith, Hugh M.*	727
Gill, Theodore.	712	Smith, John B.*	727-729
Goode, G. Brown*	712, 713	Stejneger, Leonhard*	730, 731
Goss, N. S.	713	Townsend, Charles H.	731
Grieve, Symington.	713	True, Frederick W.*	731, 732
Hay, O. P.	713	Turner, Lucien M.	732
Hitchcock, Romyn*	713	Vasey, George.	732
Holmes, W. H.*	713	Walcott, C. D.*	732, 733
Hornaday, W. T.*	714	Ward, Lester F.*	733
Hough, Walter*	714	White, Charles A.*	733
Jeffries, J. Amory.	714	Wilson, Thomas*	733
Jordan, David S.	714	Woods, C. D.	734
Jouy, P. L.	714	Yarrow, H. C.*	734
Kemp, J. F.	714		

* Connected with the National Museum.

- J. A. ALLEN. Description of a New Species of the Genus *Tityra*, from Ecuador.
The Auk, v, pp. 287-288.
 Described as a new species. *Tityra nigriceps*. Compared with specimens in the National Museum.
- W. O. ATWATER. On the Chemistry of Fish.
Amer. Chem. Jour., November, 1887; January, 1888, pp. 421-452, 1-20.
- W. O. ATWATER. On Sources of Error in determining Nitrogen by Soda Lime, and means for avoiding them.
Amer. Chem. Jour., May, 1888, pp. 197-209.
- W. O. ATWATER. Ueber die Ausnutzung des Fischfleisches im Darmkanale im Vergleich mit der des Rindfleisches.
Zeitschrift für Biologie, XXIV, 1887, pp. 16-28.
- W. O. ATWATER and E. M. BALL. On Certain Sources of Loss in the Determination of Nitrogen.
Amer. Chem. Jour., March, 1888, pp. 113-119.
- W. O. ATWATER and C. D. WOODS. Notes on the Soda-Lime Method for Determining Nitrogen.
Amer. Chem. Jour., September, 1887, pp. 311-324.
- W. O. ATWATER and C. D. WOODS. Notes on Burettes and Pipettes.
Journal of Analytical Chemistry, October, 1887, pp. 373-380.
- SPENCER F. BAIRD. [Report on the] United States National Museum. Report [of | Professor Spencer F. Baird, | Secretary of the Smithsonian Institution, | for | six months ending June 30, 1885. | — | Washington: | Government Printing Office. | 1885.
 Pp. 26-45. 8vo. Reprinted in the Smithsonian Reports, 1885, pt. 1, with same pagination.
- E. M. BALL.
 (See under W. O. Atwater.)
- EDWARD BARTLETT. A Monograph of the Weaver-Birds, Ploceidæ, and arboreal and terrestrial Finches, Fringillidæ. By Edward Bartlett. Parts I, II. Maidstone, 1888.
 4to.
 This monograph has not been seen by the Curator of Birds. The title is taken from the review in the "Ibis," 1888, p. 360. Mr. Bartlett has borrowed considerable material from the National Museum for his monograph.
- TARLETON H. BEAN. Report on the Department of Fishes in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, part II, 1885 (1886), pp. 95-98.
- TARLETON H. BEAN. Description of a new Genus and Species of Fish, *Acrotus wiloughbii*, from Washington Territory.
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- TARLETON H. BEAN. Note on *Antennarius principis* from the Bahama Islands.
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- TARLETON H. BEAN. Notes on the supposed new Trout from Sunapee Lake, New Hampshire.
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- TARLETON H. BEAN. The Habitat of the Dolly Varden.
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- TARLETON H. BEAN. The "Shad Wailer" of New Hampshire.
American Angler, XIII, No. 16, April 21, 1888, p. 252.
- TARLETON H. BEAN. Eastern Limit of Dolly Varden Trout.
American Angler, XIII, No. 3, January 21, 1888, p. 44.
- TARLETON H. BEAN. What is it? Supposed *Ambloplites rupestris* in the Yellowstone.
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- TARLETON H. BEAN. Description of a new species of *Thyrstlops* (*T. violaceus*) from the fishing banks off the New England coast.
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- TARLETON H. BEAN. The Fishery Resources and Fishing Grounds of Alaska.
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- TARLETON H. BEAN. Descriptions of five new species of fishes sent by Prof. A. Dugès from the Province of Guanajuato, Mexico.
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- CHARLES WICKLIFFE BECKHAM. Additions to the Avifauna of Bayou Sara, Louisiana.
The Auk, IV, pp. 299-306.
Notes on birds observed between April 1 and 28, 1887.
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The Auk, v, p. 112.
Compared with specimens from Florida in the National Museum.
- CHARLES E. BENDIRE. Description of the nests and eggs of the California Black-capped Gnat-catcher (*Poliophtila californica* Brewster).
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- CHARLES E. BENDIRE. Notes of a collection of birds' nests and eggs from southern Arizona Territory.
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- CHARLES E. BENDIRE. Eggs of the Ivory Gull (*Gavia alba*).
The Auk, v, pp. 202, 203.
Description of two eggs in the National Museum collected by Captain Johannsen in Spitzbergen, August 8, 1887.
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The Auk, v, pp. 225-240.
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Report of the Smithsonian Institution, Part II, 1885 (1886), pp. 57, 58.
- CHARLES H. BOLLMAN. Notes on the North American Lithobiidae and Scutigeridae.
Proc. U. S. Nat. Mus., vol. x, August, 1887, pp. 254-266.
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- WILLIAM BREWSTER. Descriptions of Supposed New Birds from Lower California, Sonora, and Chihuahua, Mexico, and the Bahamas.
The Auk, v, pp. 82-95.
Ardea virescens frazari, *Columba fasciata vioscæ*, and *Icterus wagleri castaneopectus* described as new species; *Ardea bahamensis*, *Hæmatopus frazari*, *Megascops aspersus*, *Otophanes mcleodii*, *Empidonax cineritus*, *Aimophila cahooni*, and *Troglodytes cahooni* as new species; *Otophanes* in a new Caprimulgine genus. All compared with specimens in the National Museum.
- AMOS W. BUTLER. On a New Subspecies of *Ammodramus sandwichensis* from Mexico.
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(See also under G. Brown Goode).
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Amer. Jour. Sci., XXXV, No. 210 (3d series), June, 1888, pp. 483-488.
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- HENRY K. COALE. Description of a New Subspecies of *Junco* from New Mexico.
The Auk, IV, pp. 330-331.
Described as a new sub species, *Junco hyemalis shufeldti*. Type No. 106035, U. S. National Museum.
- JOSEPH W. COLLINS. Report on the Discovery and Investigation of Fishing Grounds, made by the Fish Commission Steamer *Albatross* during a Cruise along the Atlantic Coast and in the Gulf of Mexico, with Notes on the Gulf Fisheries.
Rep. U. S. Fish Com., 1885 (1887), Part XIII, pp. 217-305. Ten plates.
- JOSEPH W. COLLINS. Delaware and its Fisheries.
The Fisheries and Fishery Industries of the United States, Section II, Part IX, pp. 407-419.

JOSEPH W. COLLINS. Management of Vessels.

The Fisheries and Fishery Industries of the United States, Section IV, 1887, pp. 130-145. Five plates.

JOSEPH W. COLLINS. The Gill-Net Cod Fishery.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, pp. 226-233. Nine plates.

JOSEPH W. COLLINS. The Shore Fisheries of Southern Delaware.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, pp. 525-541.

JOSEPH W. COLLINS. Notes on the use of Squid for food in the United States.

Bull. U. S. Fish Com., VII, October 12, 1887, p. 127.

JOSEPH W. COLLINS. Note on the occurrence of Mackerel off the Coast of Florida.

Bull. U. S. Fish Com., VII, October 12, 1887, p. 128.

JOSEPH W. COLLINS. The Work of the *Grampus*.

Forest and Stream, April 19, 1888.

This paper was read before the Biological Society at Washington. It contains a detailed statement of the investigations and fish cultural work carried on by the U. S. Fish Commission schooner *Grampus*.

JOSEPH W. COLLINS and RICHARD RATHBUN. The Sea Fishing-Grounds of the Eastern Coast of North America from Greenland to Mexico.

The Fisheries and Fishery Industries of the United States, Section III, 1887, pp. 5-78. Seventeen charts. The charts cover all the fishing grounds described. (See also under G. Brown Goode.)

E. D. COPE. On a New Species of *Tropidonotus* found in Washington.

Proc. U. S. Nat. Mus., X, 1887, p. 146.

Described as a new species, *Tropidonotus bisectus*.

E. D. COPE. List of the Batrachia and Reptilia of the Bahama Islands.

Proc. U. S. Nat. Mus., X, 1887, pp. 436-439.

CHARLES B. CORY. The Birds of the West Indies, including the Bahama Islands, the Greater and Lesser Antilles, excepting the Islands of Tobago and Trinidad.

The Auk, IV, pp. 311-328; V, pp. 48-82 and pp. 155-159.

Full list, with descriptions and synonymies, based in part on specimens in the National Museum.

CHARLES B. CORY. An apparently new *Elainea* from Barbadoes, West Indies.

The Auk, V, p. 47.

Described as a new species, *Elainea barbadensis*. Compared with material in the National Museum.

CHARLES B. CORY. Description of a supposed new form of *Margarops* from Dominica.

The Auk, V, p. 47.

Described as a new subspecies, *Margarops montanus rufus*. Compared with material in the National Museum.

ELLIOTT COUES. New Forms of North American *Chordeiles*.

The Auk, V, p. 37.

Chordeiles sennetti and *Chordeiles chapmani* described as new forms, the type of the former being No. 65490, U. S. National Museum.

WILLIAM HEALEY DALL. Report on the Department of Mollusks in the U. S. National Museum, 1885.

Report of the Smithsonian Institution for 1885, Part II, 1885 (1886), pp. 103-111.

WILLIAM HEALEY DALL. On the position of Mount St. Elias and the Schwatka expedition to Alaska.

Proc. Royal Geographical Soc., IX, No. 7, July, 1887, pp. 444, 445.

Corrects certain erroneous assumptions appearing in various publications relating to the Schwatka expedition, as to the position of the shore-line of Alaska near Mount St. Elias, and indirectly as to the position of the mountain.

WILLIAM HEALEY DALL. Notes on the Geology of Florida.

Amer. Journ. Sci., 3d ser., XXIV, Art. XIX, September, 1887, pp. 161-170.

Recites recent additions to our knowledge of the Tertiary formations in Florida, especially in the Miocene and Pliocene formations, and some conclusions as to the nature and succession of geological changes there, derived from observations recently made by the author and others. (Also printed as a separate.)

WILLIAM HEALEY DALL. Spencer Fullerton Baird.

Nation, New York, vol. XLV, No. 1170, pp. 433, 434, December 1, 1887.

A review of the life and character of the late Secretary of the Smithsonian Institution.

WILLIAM HEALEY DALL. Professor Baird in Science.

Bulletin of the Philosophical Society of Washington, x, 1888, pp. 61-70.

This paper was also published in "Proceedings at a meeting commemorative of the life and scientific work of Spencer Fullerton Baird," held January 11, 1888, under the joint auspices of the Anthropological, Biological, and Philosophical Societies of Washington, Washington, District of Columbia. (Judd & Detweiler, 1888, pp. 21-30.)

WILLIAM HEALEY DALL. Some American Conchologists.

Proc. Biol. Soc. Washington, iv, May, 1888, pp. 95-134.

Presidential address, giving brief biographical studies of eighteen of the principal deceased conchologists of the United States, with portraits of William Stimpson, Joseph Pitty Conthouy, and Isaac Lea.

(Also printed separately, with title-page and cover.)

FREDERIC P. DEWEY. Report on the Department of Metallurgy and Economic Geology in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, Part II, 1885 (1886). pp. 143-147.

FREDERIC P. DEWEY. Photographing the Interior of a Coal Mine.

Trans. Amer. Inst. Mining Engineers, xvi, 1887, p. 307.

In this is given an account of taking some photographs of the interior of the Kohinoor colliery by electric light during the summer of 1884. The paper is illustrated by plates of four of the views obtained (copied by the Levytype process) direct from the negative, without any retouching.

THOMAS DONALDSON. The | George Catlin Indian Gallery | in the | U. S. National Museum | (Smithsonian Institution), | with | Memoir and Statistics. | By | Thomas Donaldson. | — | From the Smithsonian Report for 1885. | — | Washington : | Government Printing Office. | 1887.

pp. i-vii+1-939. One hundred and forty-four plates.

WILLIAM DUTCHER. Bird Notes from Long Island, New York.

The Auk, v, pp. 169-183.

Material compared with specimens in National Museum.

R. EDWARD EARLL. The Coast of Maine and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part I, pp. 5-102.

R. EDWARD EARLL. New Jersey and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part VII, pp. 379-400.

R. EDWARD EARLL. Pennsylvania and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part VIII, pp. 401-405.

R. EDWARD EARLL. Maryland and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part x, pp. 421-448.

R. EDWARD EARLL. North Carolina and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part XII, pp. 475-497.

R. EDWARD EARLL. The Fisheries of South Carolina and Georgia.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part XIII, pp. 499-518.

R. EDWARD EARLL. Eastern Florida and its Fisheries.

The Fisheries and Fishery Industries of the United States, Section II, 1887, Part XIV, pp. 519-531.

R. EDWARD EARLL. Statistics of the Mackerel Fishery.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, pp. 304-309.

R. EDWARD EARLL. The Herring Fishery and the Sardine Industry.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, Part VI, pp. 417-524. Thirty-one plates.

R. EDWARD EARLL. The Spanish Mackerel Fishery.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, Part VIII, pp. 543-552. Two plates.

R. EDWARD EARLL. The Mullet Fishery.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, Part IX, pp. 553-582. One plate.

R. EDWARD EARLL. Statistics of the Fisheries of Maine.

Census Bulletin No. 278 (Tenth Census) pp. 1-47.

R. EDWARD EARLL and MARSHALL McDONALD. Commercial Fisheries of the Middle States.

Census Bulletin No. 297 (Tenth Census) pp. 1-14.

R. EDWARD EARLL and MARSHALL McDONALD. Commercial Fisheries of the Southern Atlantic States.

Census Bulletin No. 298 (Tenth Census) pp. 1-18.

- CARL H. EIGENMANN. Description of a new species of *Ophichthys* (*Ophichthys retro-pinnis*), from Pensacola, Florida.
Proc. U. S. Nat. Mus., x, 1887, p. 116.
 (See also under David S. Jordan.)
- D. G. ELLIOT. The *Jacaniidae*.
The Auk, v, pp. 288-305.
 A full monograph of the family, based in part on material in the National Museum.
- A. K. FISHER. *Rallus longirostris crepitans* breeding on the Coast of Louisiana.
The Auk, v, p. 108.
 Compared with specimens in the National Museum.
- C. H. GILBERT, DAVID S. JORDAN and.
 (See under David S. Jordan.)
- THEODORE GILL. The Characteristics of the *Elacatids*.
Proc. U. S. Nat. Mus., x, 1887, pp. 612-614. Plate xxxix.
- THEODORE GILL. Note on the *Gramma loreto* of Poey.
Proc. U. S. Nat. Mus., x, 1887, pp. 615, 616.
- G. BROWN GOODE. Report* upon the condition and progress of the U. S. National Museum during the half year ending June 30, 1885.
 8vo, pp. 1-264.
- G. BROWN GOODE. Scientific Men and Institutions in America.
The Epoch, i, 1887, p. 467.
- G. BROWN GOODE. A New Work on American Birds.
The Epoch, ii, 1887, p. 336.
 Review of Ridgeway's "Key."
- G. BROWN GOODE. American Fishes: | A popular treatise | Upon the | Game and Food Fishes | of | North America, | with special reference to habits and methods | of capture. | By | G. Brown Goode. | * * * | — | With numerous illustrations. | — | New York: | Standard Book Company. | 1888.
 Royal 8vo, pp. i-xv+1-496.
- G. BROWN GOODE. United States Commission of Fish and Fisheries | Spencer F. Baird, Commissioner | — | The Fisheries | and | Fishery Industries | of the | United States | — | Prepared through the co-operation of the Commissioner of Fisheries— and the Superintendent of the Tenth Census | by | George Brown Goode | Assistant Secretary of the Smithsonian Institution | and a staff of Associates | — Washington | Government Printing Office | 1887.
 Section II. A geographical review of the Fisheries Industries and Fishing Communities for the year 1880. pp. i-ix+1-787, 4to.
 Section III†. The Fishing Grounds of North America, with forty-nine charts. Edited by Richard Rathbun. pp. i-xviii+5-238, 4to.
 Section IV†. The Fishermen of the United States. By George Brown Goode and Joseph W. Collins. pp. 1-178, 4to.
 Section V. History and Methods of the Fisheries. In two volumes, with an atlas of 255 plates. Vol. I: pp. i-xxii+1-808, 4to. Vol. II: pp. i-xx+1-881, 4to.
- G. BROWN GOODE. The Beginnings | of | Natural History | in | America. | — | An Address delivered at the Sixth Anniversary | Meeting of the Biological Society | of Washington. | — | By | G. Brown Goode, | President of the Society. | — | From the Proceedings of the Biological Society of Washington, Volume III, 1884-1886. | — | Washington: | Printed for the Society. | 1886.
 pp. [35]-[105], 8vo.
 Printed also as a separate.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Fishermen of the United States.
The Fisheries and Fishery Industries of the United States, Section IV, 1887, pp. 1-129. Thirteen plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Mackerel Fishery of the United States.
The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, pp. 245-304. Thirty plates.

* In Smithsonian Report, Part II. † These two sections are in one volume.

- G. BROWN GOODE and JOSEPH W. COLLINS. The Fresh Halibut Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, 1887, pp. 3-89.
Twenty-two plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Bank Hand-line Cod Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, 1887, pp. 123-133.
Two plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Labrador and Gulf of Saint Lawrence Cod Fisheries.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, pp. 133-147.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Bank Trawl-line Cod Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, pp. 148-187. Five plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The George's Bank Cod Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, pp. 187-198. Six plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Haddock Fishery of New England.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, pp. 234-241. Three plates.
- G. BROWN GOODE and JOSEPH W. COLLINS. The Hake Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, pp. 241-243. Three plates.
- G. BROWN GOODE. The Swordfish Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, 1887, pp. 315-326.
Two plates.
- G. BROWN GOODE and A. HOWARD CLARK. The Menhaden Fishery.
The Fisheries and Fishery Industries of the United States, Section v, vol. 1, 1887, pp. 327-415.
Thirty-two plates.
- N. S. GOSS. New and Rare Birds Found Breeding on the San Pedro Martir Isle, (Gulf of California.)
The Auk, v, pp. 240-244.
Material compared with specimens in the National Museum. *Sula gossi* and *Sula brewsteri* described as new species from R. Ridgway's manuscript. Types presented to the National Museum.
- SYMINGTON GRIEVE. Recent information about the Great Auk, or Garefowl, *Alca impennis* Linn.
Transactions of the Edinburgh Field Naturalists' and Microscopical Society, September 1883, pp. 1-27.
Presidential address on the occasion of the twentieth session of the society. This paper gives a résumé of the most recent information in regard to the Great Auk, including some additions to and corrections of the lists given in Mr. Grieve's monograph. There are many references to the material and information collected by the *Grampus* expedition, and the National Museum is shown to possess more than half the amount of osteological material extant.
- O. P. HAY. A Contribution to the knowledge of the Fishes of Kansas.
Proc. U. S. Nat. Mus., x, 1887, pp. 242-253.
- ROMYN HITCHCOCK. Report on the Section of Textile Industries in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, Part II, 1885 (1886), pp. 59-60.
- ROMYN HITCHCOCK. Report on the Section of Foods in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, Part II, 1885 (1886), p. 61.
- ROMYN HITCHCOCK. The Biological Examination of Water.
Amer. Micr. Journ. VIII, Nos. 8, 9, 11, August, September, November, 1887, pp. 147, 169, 203.
Contains results of examination of two specimens of ice in Japan.
- W. H. HOLMES. Report on the Section of American Prehistoric Pottery in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, Part II, 1885 (1886), p. 69.

W. T. HORNADAY. The Passing of the Buffalo.

The Cosmopolitan Magazine, IV, Nos. 2 and 3, October and November, 1887, pp. 85-98 and 231-243. Fifteen illustrations.

A popular account of the Smithsonian Expedition for American Bison, and its results. The illustrations of bisons are highly finished wood engravings from photographs of the specimens mounted for the National Museum group, and by many are considered the finest representations of the species ever published.

WALTER HOUGH. An Eskimo Strike-a-light from Cape Bathurst, British America.

Proc. U. S. Nat. Mus., XI, 1888, pp. 181, 184.

Reprinted in "Scientific American Supplement," XXVII, No. 694, April 20, 1889.

This paper describes a very complete set of fire-making apparatus used by the Eskimo of Cape Bathurst, a region lying half way between the great groups of the east and the Alaskan Eskimo. The ordinary processes of fire-making among the western Eskimo have been described by Mr. Hough in an extended paper, published in this volume. The strike-a-light herein described consists of a cylinder of pyrites, or sulphate of iron, a piece of flint, and a little pouch of dried cedar bark, to serve as a tinder, the whole packed in a water-proof bag of fur and arranged in the most convenient manner. The importance of this specimen lies in the fact that it raises the question of the antiquity of this method of fire-making among the aborigines of the Arctic.

WALTER HOUGH. Notes on the Ethnology of the Congo.

American Naturalist, XXI, 1887, pp. 689-693.

A résumé of technological processes and notice of customs as brought out by observation of the collections from the Congo in the U. S. National Museum. Smelting, quality of iron, manufacture of weapons, kinds of weapons, originality and conventionality in design, mode of execution, money, clothing, weaving, food, religion.

WALTER HOUGH. The Magic Mirror of China and Japan.

American Naturalist, XXII, January, 1888, pp. 86-88.

J. AMORY JEFFRIES. A Description of an Apparently New Species of *Trochilus* from California.

The Auk, V, pp. 168, 169.

Described as a new species, *Trochilus violajugulum*. Compared with specimens in the National Museum.

DAVID S. JORDAN. Note on the "Analyse de La Nature" of Rafinesque.

Proc. U. S. Nat. Mus., X, 1887, pp. 480, 481.

DAVID S. JORDAN. Description of a new species of *Callionymus* (*Callionymus bairdi*) from the Gulf of Mexico.

Proc. U. S. Nat. Mus., X, 1887, pp. 501, 502.

DAVID S. JORDAN. Note on *Polynemus californiensis* of Thomiot.

Proc. U. S. Nat. Mus., X, 1887, p. 322.

DAVID S. JORDAN and CARL H. EIGENMANN. Notes on a collection of fishes sent by Mr. Charles C. Leslie, from Charleston, South Carolina.

Proc. U. S. Nat. Mus., X, 1887, pp. 269, 270.

DAVID S. JORDAN and C. H. GILBERT. Description of a new species of *Thalassophryne* (*Thalassophryne dowi*), from Punta Arenas and Panama.

Proc. U. S. Nat. Mus., X, 1887, p. 388.

P. L. JOUY. Cormorant Fishing.

Evening Post, New York, October 13, 1887, p. 3.

Correspondence to the "Evening Post," from Boston, giving an abstract of Mr. Jouy's paper on the subject of Cormorant Fishing in Japan, as read before the annual meeting of the American Ornithologists' Union held in Boston, October, 1887.

P. L. JOUY. On Cormorant Fishing in Japan.

American Naturalist, XXII, January, 1888, pp. 1-3.

An account of the author's trip to the Banagawa River, Central Japan, to witness the capture of *Plecoglossus altivelis* by trained Cormorants.

J. F. KEMP. Notes on the Ore Deposits and Ore Dressing in southeast Missouri.

School of Mines Quarterly, IX, No. 1, October, 1887, p. 74.

This paper embraces the author's observations upon the ore deposits, the methods of mining, and the mechanical dressing of the ore. The last subject is treated very fully.

J. F. KEMP. Notes on Lead Smelting in southeast Missouri.

School of Mines Quarterly, IX, No. 3, April, 1888, p. 212.

Gives a description of the various smelting processes followed, together with many valuable analyses.

- J. H. KIDDER. Report on the Thermometers of the U. S. Commission of Fish and Fisheries.
Rep. U. S. Fish Com., 1885 (1887), Part XIII, pp. 185-213. Twenty figures.
- F. H. KNOWLTON. A Protest Against Bird Murdering.
The American Angler, XIII, No. 8, February 25, 1888, p. 118.
 A protest against the destruction of small birds. (This article was copied by the "Utica Herald," New York.)
- F. H. KNOWLTON. The Geographical History of Plants. By Sir William Dawson.
 (Review.)
Public Opinion, IV, March 3, 1888.
 This also appeared in "The Botanical Gazette," XIII, 1888, pp. 167-168.
- F. H. KNOWLTON. Introduction to Physical Science. By A. P. Gage. (Review.)
Public Opinion, IV, March 10, 1888.
- F. H. KNOWLTON. The Story of Creation; a Plain Account of Evolution. By Edward Clodd. (Review.)
Public Opinion, IV, March 17, 1888.
- F. H. KNOWLTON. The English Sparrow Question.
The Brandon Union, Vermont.
 Account of the distribution and extent of damages done.
- F. H. KNOWLTON. Fossil Woods of the Northwest. By Sir Wm. Dawson. (Review.)
The Botanical Gazette, XIII, 1888, p. 66.
- F. H. KNOWLTON. Evolution and its Relation to Religious Thought. By Joseph Le Conte. (Review.)
Public Opinion, V, April, 1888.
- F. H. KNOWLTON. Lichens from the Easter Islands.
The Botanical Gazette, XIII, 1888, p. 94.
 Enumerates several species of lichens found on the stone idol, brought to the U. S. National Museum from the Easter Islands.
- F. H. KNOWLTON. Gospels of Yesterday. By Richard Watson. (Review.)
Public Opinion, V, April, 1888.
- F. H. KNOWLTON. Practical Education. By Charles G. Leland. (Review.)
Public Opinion, V, April, 1888.
- F. H. KNOWLTON. Volcanoes and Earthquakes. By Samuel Kneeland. (Review.)
Public Opinion, V, May 3, 1888.
- F. H. KNOWLTON. The Icelandic Discoverers of America. By M. A. Brown. (Review.)
Public Opinion, V, May 10, 1888.
- F. H. KNOWLTON. Discovery of the Origin of the Name of America. By Thomas de St. Bris. (Review.)
Public Opinion, V, May 19, 1888.
- F. H. KNOWLTON. Old and New Astronomy. By Richard Proctor. (Review.)
Public Opinion, V, May 19, 1888.
- F. H. KNOWLTON. The Credentials of Science. By Josiah P. Cooke. (Review.)
Public Opinion, V, May 25, 1888.
- F. H. KNOWLTON. Social History of the Races of Mankind. By A. Featherman.
 (Review.)
Public Opinion, V, May 25, 1888.
- F. H. KNOWLTON. Accidents and Emergencies. By Charles W. Dolles. (Review.)
Public Opinion, V, May 25, 1888.
- F. H. KNOWLTON. Tenting on the Plains. By Elizabeth G. Custer. (Review.)
Public Opinion, V, June 1, 1888.
- F. H. KNOWLTON. German Exercises. By Ferd. Stein. (Review.)
Public Opinion, V, June 1, 1888.
- F. H. KNOWLTON. The Civil War in America. By the Count de Paris. (Review.)
Public Opinion, V, June 8, 1888.
- F. H. KNOWLTON. Coast Defenses of the United States. By Henry L. Abbot.
 (Review.)
Public Opinion, V, June 15, 1888.
- F. H. KNOWLTON. Description of a New Fossil Species of the Genus *Chara*.
Botanical Gazette, XIII, 1888, pp. 156-157.

F. H. KNOWLTON. Great Fossil Forests: One of the Wonders of the Yellowstone National Park.

The Evening Star, Washington, February 6, 1888, p. 4.

F. H. KNOWLTON. A Monograph on Stigmaria. By W. C. Williamson. (Review.) *Botanical Gazette*, XIII, 1888, pp. 43-44.

F. H. KNOWLTON. A visit to a Fossil Forest.

The Brandon Union, Vermont, January 20, 1888.

Describes a visit made to the Yellowstone National Park.

S. R. KOEHLER. Museum of Fine Arts. | Print Department. | — | Exhibition | of | the etched work of Rembrandt, | and of artists of his circle, | together with engravings, etchings, etc., from paintings | and sketches by him. Principally from | the collection of | Mr. Henry F. Sewall, | of New York. | — | April 26 to June 30, 1887. | (seal of the Museum) | Boston: | Printed for the Museum by Alfred Mudge & Son, | 24 Franklin street. | 1887. | 12mo. pp. xiii, 84.

Contains a complete short catalogue of the etched work of Rembrandt, arranged chronologically, in the main according to Vosmaer's list, with an introduction.

S. R. KOEHLER. John Webber und die Erfindung der Lithographie.

Kunstchronik, Leipzig, xxiii, Nos. 3, 4, and 32, October 27, November 3, 1887, and May 17, 1888.

Controverting the claim, advanced by M. König, of Vienna, that John Webber invented lithography in London in the year 1788, ten years before Senefelder.

S. R. KOEHLER. A Chapter in "Die vervielfältigende Kunst der Gegenwart. Redigirt von Carl von Lützow.—I. Der Holzschnitt.—Wien. Gesellschaft für vervielfältigende Kunst. 1887." pp. 191-214. "F. Nordamerika."

This volume forms part of an extensive work, now in course of publication, on the history of the reproductive arts, in which the various divisions have been assigned to writers supposed to be specially well informed concerning the subject-matter treated in them. The chapter in question is on wood-engraving in the United States in the second half of the nineteenth century.

S. R. KOEHLER. The new school of wood-engraving.

The Art Review, New York, December, 1887.

An attempt to show that the so-called "new school" of wood engraving is not merely a freak, but an historical necessity.

S. R. KOEHLER. Zur Kritik des Rundschau. Artikels über die gegenwärtige Lage der Kupferstechkunst.

Chronik für vervielfältigende Kunst, Vienna, i, No. 3, May, 1888.

A protest against the prevalent unscientific treatment of questions relating to the reproductive arts.

S. R. KOEHLER. Museum of Fine Arts. | Print Department. | — | Exhibition | of | the work of the women etchers | of America. | — | Nov. 1 to Dec. 31, 1887. | (seal of the Museum) | Boston: | Printed for the Museum by Alfred Mudge & Son, | 24 Franklin street, | 1887. | 12mo. pp. 26.

Catalogue of the proofs exhibited, with an introduction, giving some details concerning the history of women as etchers. (The exhibition was repeated, with additions, by the Union League Club, of New York, April 12-21, 1888, and the catalogue issued by this organization, with an introduction by Mrs. Schuyler van Rensselaer, must be consulted for corrections.)

S. R. KOEHLER. Museum of Fine Arts. | Print Department. | — | Exhibition | of | Albert Dürer's | engravings, etchings, and dry-points, | and of most of the wood cuts executed | from his designs. | Selected from the collection of Mr. Henry F. Sewall, of | New York, and from the Gray Collection | belonging to Harvard College. | Together with | eight original drawings | from the collection von Franck. | November 15, 1888, to January 15, 1889. | (seal of the Museum) | Boston: | Printed for the Museum by Alfred Mudge & Son, | 24 Franklin street. | 1888. | 12mo. pp. xxii, 81.

LUDWIG KUMLIEN and FREDERICK W. TRUE. The Fishing Grounds of the Great Lakes.

The Fisheries and Fishery Industries of the United States. Section III, 1887, pp. 117-131.

W. LILLJEBORG. Contributions to the Natural History of the Commander Islands.

Proc. U. S. Nat. Mus., x, 1887, pp. 154-156.

On the Entomostraca collected by Dr. Leonhard Stejneger on Bering Island, 1882-1883.

- EDWIN LINTON. Notes on a Trematode from the White of a Newly-laid Hen's Egg.
Proc. U. S. Nat. Mus., x, 1887, pp. 367-369.
- F. A. LUCAS. Notes on the Osteology of the Spotted Tinamou.
Proc. U. S. Nat. Mus., x, July 2, 1887, pp. 157-158. Two figures in text.
- F. A. LUCAS. The Flight of Birds.
Science, xi, No. 261, February 3, 1888, pp. 58-59.
Notes on the soaring of birds, and denying that the interlocking of the primaries was under the control of the bird, or of advantage to it.
- F. A. LUCAS. The Bird Rocks of the Gulf of St. Lawrence in 1887.
The Auk, v, No. 2, April, 1888, pp. 129-135.
Description of these islets, and comparison with the accounts of previous visits.
- OTIS T. MASON. Report on the Department of Ethnology in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, 1885 (1886), part II, pp. 63-67.
- OTIS T. MASON. Hairy human family.
Science, ix, No. 205, January 7, 1887, pp. 16-17.
- OTIS T. MASON. Synechdochical Magic.
Science, ix, No. 205, January 7, 1887, pp. 17-18.
- OTIS T. MASON. The Aboriginal Miller.
Science, ix, No. 206, January 14, 1887, pp. 25-28. Two plates.
- OTIS T. MASON. The Hupa Indians.
Science, ix, No. 211, February 18, 1887, pp. 149-152. Two plates.
- OTIS T. MASON. Arrangement of Museums.
Science, ix, No. 226, June 3, p. 534.
- OTIS T. MASON. The occurrence of similar inventions widely separated.
Science, ix, No. 226, June 3, 1887, pp. 534-535.
- OTIS T. MASON. Indian Cradles and Head-Flattening.
Science, ix, No. 229, June 24, 1887, pp. 617-620. Two plates.
- OTIS T. MASON. Ancient Scrapers.
Science, x, No. 230, July 1, 1887, p. 10.
- OTIS T. MASON. Méthode de Classification dans les Musées d'Ethnographie.
Revue d'Ethnographie, Paris, vi, pp. 239-242.
- OTIS T. MASON. (Anthropological Notes.)
American Anthropologist, vol. i, 1888. The Law of Malthus, p. 23. Time Check in China, p. 49. Dornial Topography, p. 171. Chinese Partnerships, p. 191.
- JEROME MCNEILL. List of the Myriapods found in Escambia County, Florida, with descriptions of six new species.
Proc. U. S. Nat. Mus., x, September, 1887, pp. 323-327, plate ix.
Gives a list of seventeen species of which the following new species are in the Museum collection: *Polydesmus bimaculatus*, *P. varius*, *Julus lineatus*, *Schlendyla? perforatus*, *Lithobius clarus*, *L. aureus*.
- JEROME MCNEILL. Descriptions of Twelve New Species of Myriapoda, chiefly from Indiana.
Proc. U. S. Nat. Mus., x, March 10, 1888, pp. 328-334, plate xii.
Describes as new *Hexaglena* n. gen. *H. cryptocephala*, *Polydesmus castaneus*, *Trichopetalum bullmani*, *Lisioptelatum eudasygn*, *Julus multiannulatus*, *Geophilus brunneus*, *G. indianae*, *G. varians*, *Mecistocephalus umbraticus*, *M. strigosus*, *M. foveatus*, *Scolopocryptus nigridius*.
- C. HART MERRIAM. *Eueltheia canora* from Sombrero Key, Florida. A Bird New to the United States.
The Auk, v, p. 322.
Compared with specimens in the U. S. National Museum, and the fragment from which the identification was made presented to the Museum.
- GEORGE P. MERRILL. Report on the Department of Lithology and Physical Geology in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, 1885 (1886), part II, pp. 139-142.
- GEORGE P. MERRILL. The Salt Industry in the United States.
Nature, xxxvii, No. 963, April 12, 1888, p. 558.
A note calling attention to a discrepancy in the latest edition of the British Encyclopædia relative to the salt industry of the United States.

GEORGE P. MERRILL. Note on the Secondary Enlargement of Augites in a Peridotite from Little Deer Isle, Maine.

Am. Jour. Sci., XXXV, No. 210, June, 1888, pp. 488-490.

Describes as the title denotes a case of secondary enlargement on the augites. It is believed the phenomena is here noted for the first time.

GEORGE P. MERRILL. Common Salt. Its Geology and Manufacture.

The Chautauquan, VIII, No. 2, November, 1887, pp. 82-85.

A condensed though somewhat popular account of the origin and position of the salt beds of the world, the methods of mining and manufacture, and statistics so far as obtainable of the annual output of the world.

GEORGE P. MERRILL. What makes it Rain?

St. Nicholas, XV, No. 6, April, 1888, pp. 403-405. (Two illustrations.)

A popular article for young readers on the cause and distribution of the rain-fall.

GEORGE P. MERRILL. On a New Meteorite from the San Emigdio Range, San Bernardino County, California.

Am. Jour. Sci., XXXV, No. 210, pp. 490-491.

Describes in brief a hitherto unknown meteoric stone of the Chondrite variety, found by a prospector in the San Emigdio Mountains.

GEORGE P. MERRILL. Concerning the Montville Serpentine.

Science, XI, No. 281, June 22, 1888, p. 302.

A brief preliminary note on the metasomatic origin of the serpentine of the above named locality. The full paper ultimately appears in the Proceedings of the U. S. National Museum.

J. C. MERRILL. Notes on the Birds of Fort Klamath, Oregon. (With Remarks on certain species by William Brewster).

The Auk, V, pp. 139-146, and pp. 251-262.

Frequent reference to material in the U. S. National Museum.

EDWARD W. NELSON. (Forty-ninth Congress, First Session. Senate. Mis. Doc. No. 156.) Report upon Natural History Collections made in Alaska between the years 1877 and 1881 by Edward W. Nelson. — Edited by Henry W. Henshaw. — Prepared under the direction of the Chief Signal Officer. — No. III. Arctic Series of Publications issued in connection with the Signal Service, U. S. Army. With Twenty-one Plates. — Washington: Government Printing Office. | 1887.

337 pp, 4to. Twenty-one plates.

The "Birds of Alaska," forming Part I, occupy pp. 18-226, illustrated by twelve colored plates by R. and J. L. Ridgway. A "Partial Bibliography of Alaskan Ornithology" is found on pp. 223-226. The collections upon which this report is based were made during the years 1877 to 1881 by the author for the U. S. National Museum, while in Alaska as an observer in the U. S. Signal Service. Acknowledgments are made to Messrs. R. Ridgway and L. Stejneger for assistance conferred upon the author while writing the ornithological part of the report.

WILLIAM PALMER and HUGH M. SMITH. Additions to the Avifauna of Washington and Vicinity.

The Auk, V, pp. 147, 148.

Based in part on material in the U. S. National Museum. The specimen of *Dendroica kirtlandi*, collected by Mr. Palmer, and now in the National Museum, is one of the most noteworthy additions.

PAUL PELSENER. Report on the Pteropoda collected by H. M. S. *Challenger* during the years 1873-76. Part I. The Gymnosomata.

Report on the Scientific Results of the Exploring Voyage of H. M. S. Challenger, 1873-76, Zoology, XIX, Part IV, 1887, pp. 1-74, Plates I-III.

General revision of the Pteropoda Gymnosomata, or naked Pteropods, for which water-color drawings taken from life and alcoholic specimens of various species were furnished to the Royal Museum of Natural History, Brussels, Belgium, for the use of M. Pelsener. It should be noted that by neglecting to use the drawings and depending on diagrams prepared from specimens preserved in spirits, grave errors of form and proportion have been introduced into the plates of this work. The wing-like processes which give the Pteropods their name, shrink out of all proportion when immersed in alcohol. In the case of *Pneumodermon pacificum* the "wings" are 8.3^{mm} long by 6^{mm} wide in a specimen 16^{mm} in length of body. In the plates referred to, the measurements would be 4.2^{mm} long and 3.1^{mm} wide. For this extraordinary misconception the drawings, accurately made from life and furnished by the U. S. National Museum, should not in any way be held responsible.

RICHARD RATHBUN. Report on the Department of Marine Invertebrates in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 117-127.

RICHARD RATHBUN. Annotated Catalogue of the species of Porites and Synaræa in the U. S. National Museum, with a description of a new species of Porites.

Proc. U. S. Nat. Mus., x, 1887, pp. 354-366, Plates XV-XIX.

Twenty-three species of *Porites* and three of *Synaræa* are enumerated. Prof. J. D. Dana described eighteen new species of *Porites* from the collections of the United States Exploring Expedition of 1838-42. Four of these are now referred to the genus *Synaræa* Verrill. The type specimens of sixteen of Dana's species are now contained in the U. S. National Museum and are included in this list. One new species, *P. Branneri*, is described from Brazil. Notes are given on *P. astræoides*, *solida*, *clavaria*, and *furcata*, all of which are represented by large series of specimens. The principal varieties of *clavaria* and *furcata*, and the cell structure of *Branneri*, are illustrated on the plates.

RICHARD RATHBUN. Descriptions of the species of *Heliaster* (a genus of Starfishes) represented in the U. S. National Museum.

Proc. U. S. Nat. Mus., x, 1887, pp. 440-449, Plates XXXII-XXXVI.

Four species are described and figured, and brief diagnoses of each are also given. They are as follows: *Heliaster microbrachia* Xantus, *Cumingii* Gray, *helianthus* Gray, and *multiradiata* Gray. The types of Xantus's species, *microbrachia* and *Cumingii*, described in 1860, are preserved in the Museum. Recent collections from the Galapagos Islands contain two species which are evidently those described by Gray, in 1840, from the same region (*Cumingii* and *multiradiata*), but which have not since been observed by naturalists, Gray's types having also disappeared. *H. Cumingii* of Xantus and *H. multiradiata* of Gray are shown to be identical.

RICHARD RATHBUN. Ocean Temperatures of the Eastern Coast of the United States, with thirty-two charts.

The Fisheries and Fishery Industries of the United States, Section III, 1887, pp. 155-177.

This report is based upon temperature observations taken twice daily at twenty-four light-houses and light-vessels, more or less favorably located for ascertaining the ocean temperatures along the coast, and covers the five years from 1881 to 1885, inclusive. Each station is represented by a graphic chart, on which the temperature of the surface water is plotted by curves for each of the five years, and that of the air for two years (1881 and 1882), being reduced to ten-day means. Seven charts relate to the surface isotherms derived from the same observations. These are shown for every five degrees of temperature from 40° to 80° by yearly charts, and by one chart giving the mean results for the five years. One chart also exhibits the relations between the air and surface isotherms. These charts were constructed to illustrate the influence of temperature upon the movements of the mackerel, menhaden, and other species of migratory fishes.

RICHARD RATHBUN. [The Crab, Lobster, Crayfish, Rock Lobster, Shrimp, and Prawn Fisheries. The Leech Industry and Trepanng Fishery. The Sponge Fishery and Trade.]

The Fisheries and Fishery Industries of the United States, Section V, vol. II, 1887; Part XXI, pp. 627-810; Part XXII, pp. 811-816; Part XXIII, pp. 817-841.

(See also under Joseph W. Collins.)

CHARLES RAU. Report on the Department of Antiquities in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 71-78.

CHARLES W. RICHMOND. An Annotated List of Birds Breeding in the District of Columbia.

The Auk, v, pp. 18-25.

Recording one hundred species of birds as breeding in the District.

ROBERT RIDGWAY. Report on the Department of Birds in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 85-91.

ROBERT RIDGWAY. A Manual of North American Birds. By Robert Ridgway. — Illustrated by 464 outline drawings of the Generic Characters. — Philadelphia: J. B. Lippincott Company. 1887.

xi, 631 pages, qr. 8vo. One phototype and one hundred and twenty-four plates.

The object of this work is to furnish a convenient manual of North American ornithology, reduced to the smallest compass by the omission of everything that is not absolutely necessary for determining the character of any given specimen, and including, besides the correct nomen-

ROBERT RIDGWAY—Continued.

clature of each species, a statement of its natural habitat, and other concomitant data. The classification, numeration, and nomenclature conform strictly with the "Check List of North American Birds" recently published by the American Ornithologists' Union. The geographical limits of the work also conform to those adopted by the American Ornithologists' Union; but it has been deemed advisable, for the special benefit of observers or investigators along our southern border, to include in the synopsis all Mexican, Cuban, and Bahaman species of each North American genus, and also, in the keys to the genera, additional Mexican genera. Special exception to geographical limitation has been made in the case of the Petrels and Albatrosses, pelagic birds whose fortuitous wanderings render it possible for almost any species to occur in our waters as an accidental visitor. The frontispiece is an excellent engraving of the late Prof. Spencer F. Baird.

ROBERT RIDGWAY. Description of a New Species of *Porzana* from Costa Rica.

Proc. U. S. Nat. Mus., x, 1887, p. 111.

Described as a new species, *Porzana alfari*.*

ROBERT RIDGWAY. Notes on *Ardea wurdemanni* Baird.

Proc. U. S. Nat. Mus., x, 1887, pp. 112-115.

ROBERT RIDGWAY. *Trogon ambiguus* breeding in Arizona.

Proc. U. S. Nat. Mus., x, 1887, p. 147.

Description of the nestling plumage of this species from a specimen collected by Lieut. H. C. Benson, U. S. Army.†

ROBERT RIDGWAY. Description of a New Plumed Partridge from Sonora.

Proc. U. S. Nat. Mus., x, 1887, pp. 148-150.

Described as a new subspecies, *Callipepla elegans bensoni*, type No. 110502, U. S. National Museum.‡

ROBERT RIDGWAY. Description of a New Genus of Dendrocolaptine Bird from the Lower Amazon.

Proc. U. S. Nat. Mus., x, 1887, p. 151.

Picolaptes rikeri made the type of a new genus, *Berlepschia*.

ROBERT RIDGWAY. Description of a New Species of *Phacellodomus* from Venezuela.

Proc. U. S. Nat. Mus., x, 1887, p. 152.

Described as a new species, *Phacellodomus inornatus*, type, No. 89794, U. S. National Museum.

ROBERT RIDGWAY. Description of two New Species of Kaup's Genus *Megascops*.

Proc. U. S. Nat. Mus., x, 1887, pp. 267, 268

Described as new species, *Megascops vermiculatus* and *Megascops hastatus*, types Nos. 55978 and 85673, U. S. National Museum.

ROBERT RIDGWAY. Description of a New *Muscisaxicola*, from Lake Titicaca, Peru.

Proc. U. S. Nat. Mus., x, 1887, p. 430.

Described as a new species, *Muscisaxicola occipitalis*.

ROBERT RIDGWAY. On *Phrygilus gayi* (Eyd. & Gerv.) and Allied Species.

Proc. U. S. Nat. Mus., x, 1887, pp. 431-435.

A synopsis of the group, with full synonymy, etc. *Phrygilus punensis* described as new.

ROBERT RIDGWAY. Description of two new Races of *Pyrrhuloxia sinuata* Bonap.

The Auk, iv, p. 347.

Described as new races, *Pyrrhuloxia sinuata beckhami* and *P. s. peninsulae*, types, U. S. National Museum, Nos. 6370 and 87547.

ROBERT RIDGWAY. On the correct subspecific title of Baird's Wren (No. 719 c. A. O. U. C. L.).

The Auk, iv, pp. 349, 350.

Proposes to substitute the name *Thryothorus bewickii murinus* (Hartl.) as prior to *Thryothorus bewickii leucogaster* Baird and *Thryothorus bairdi* Salv. & Godm.

ROBERT RIDGWAY. Spencer Fullerton Baird. (Read before the Fifth Meeting of the American Ornithologists' Union.)

The Auk, v, pp. 1-14.

Biographical notice, with writer's reminiscences.

ROBERT RIDGWAY. Description of a New *Tityra* from Western Mexico.

The Auk, v, p. 263.

Described as a new subspecies, *Tityra personata griseiceps*, type, U. S. National Museum, No. 58235.

* Acc. 19345.

† Acc. 18082.

‡ Acc. 18730.

ROBERT RIDGWAY. (Letter addressed to the Editors of "The Ibis" in regard to the Breeding Plumage of *Colymbus occidentalis*.)

Ibis, 5th ser., v, 1887, pp. 361-362.

Shows that the summer plumage of *Colymbus occidentalis* was known to and correctly described by North American ornithologists, and suggests that the bird described in a previous number by Canon Tristram as such may be a *Colymbus holboellii* with the throat unusually light-colored.

ROBERT RIDGWAY. Grouse and Mallard Plumage.

Forest and Stream, XXIX, No. 24, January 25, 1888, p. 463.

C. V. RILEY. Report on the Department of Insects in the U. S. National Museum, 1885.

Report of the Smithsonian Institution for 1885. (1886), Part II, pp. 113-116.

CHARLES V. RILEY. The Life History of the Icerya. Forms of the Cottony Cushion Scale.

Pacific Rural Press, XXXIV, July 2, 1887, p. 9.

Editorial quotations from the reports of the author for 1886, and gives copy of plates with figures of the ♂ insect. Description of life history of the male.

CHARLES V. RILEY. The Hop Plant-Louse.

Country Gentleman, LII, July 7, 1887, p. 529.

Résumé of the recent discoveries in the life history of the species, setting forth the proof of migration from plum to hop, the number of broods thus far observed, and the probable course of the later broods.

CHARLES V. RILEY. A New Apple Pest. The Apple Leaf Flea-Beetle (*Haltica punctipennis* Le Conte).

Gardener's Monthly, XXIX, July, 1887, p. 216.

A brief history of the species as a new injurious insect, giving habits and remedies.

CHARLES V. RILEY. Whitewashing Trees.

City and Country (Columbus, Ohio), VI, August, 1887, p. 217.

Quotes the author's views discountenancing the practice as valueless against certain tree defoliators.

CHARLES V. RILEY. Report of Observations and Experiments in the Practical Work of the Division, made under the Direction of the Entomologist.

U. S. Department of Agriculture, Division of Entomology, Bulletin, No. 14, August 3, 1887, pp. 1-62. One plate; two figures.

Contains the following papers: Introduction, by C. V. Riley, pp. 7, 8; a general commentary on the other contents of the bulletin, especially disclaiming concurrence in the conclusions of D. B. Wier. Report on Insects Injurious to Garden Crops in Florida, by Wm. H. Ashmead, special agent, pp. 9-29. Report on Buffalo Gnats, by F. M. Webster, special agent, pp. 29-39. The Native Plums—How to Fruit them—They are Practically Curculio-Proof, by D. B. Wier, pp. 39-52. The Serrell Automatic Silk Reel, by Philip Walker, pp. 52-59, with plate and two figures.

CHARLES V. RILEY. The Icerya or Fluted Scale, otherwise known as the Cottony Cushion-Scale.

U. S. Department of Agriculture, Division of Entomology, Bulletin No. 15, August, 1887, pp. 1-40.

[Reprint of some recent articles by the Entomologist and of a report from the Agricultural Experiment Station, University of California.]

Contains the following: The Scale Insects of the Orange in California, and particularly the Icerya or Fluted Scale, alias White Scale, alias Cottony Cushion-scale, etc. [Address by Prof. C. V. Riley before the California State Board of Horticulture, at its semi-annual session at Riverside, California, April 12, 1887, as reported in the *Pacific Rural Press*, June 11, 1887, pp. 27-33.] The use of gases against Scale Insects. Report from Bulletin No. 71, Agricultural Experiment Station, University of California, pp. 35-40.

CHARLES V. RILEY. Discovery of the female of *Phengodes*.

Entomologica Americana, III, September, 1887, p. 107.

Brief statement of the characters of the ♀ *Phengodes*, before the Ent. Club A. A. A. S., forming part of the published minutes.

CHARLES V. RILEY. Pronuba and the Pollination of Yucca.

Entomologica Americana, III, September, 1887, pp. 107, 108.

Gives a record of the results of recent experiments on the pollination of Yucca and the agency of Pronuba in this work. Reiterates his previously expressed views on this subject. (In Proc. Ent. Club A. A. A. S.)

CHARLES V. RILEY. The Hop Plant-Louse.

Gardener's Chronicle, September 17, 1887, p. 333.

Editorial summary of observations made, practically the same as in the *Proc. Brit. Ass. Adv. Sci.* (See later record.)

CHARLES V. RILEY. Beschreibung einer den Birnen schädlichen Gallmücke (? *Diplotis nigra* Meig.).

Wiener Entomologische Zeitung, vi, September, 1887, pp. 201-206. Three figures.

Details the discovery of the species in America, its habits there, and life history. Gives a full description of the species in all stages, suggests a possible difference from the European species, and proposes the name *D. pyrivora*, should the American form eventually prove distinct.

CHARLES V. RILEY. Some Important Discoveries in the Life History of the Hop Plant-Louse (*Phorodon humuli* Schrank).

Scientific American, Suppl., XXIV, September 24, 1887, p. 9781.

A summary or abstract of a paper read before the Society for the Promotion of Agricultural Science, giving the result of experiments, proving the migration of the species from hop to plum in fall, the life of the egg on plum in winter, and the spring migration to hop.

Reprint in *Gardener's Monthly*, XXIX, October, 1887, p. 309, and in various other journals.

CHARLES V. RILEY. The Hessian Fly in England.

Proc. Ent. Soc. Lond., 1887, pp. 45-48.

Discusses the question of the date of introduction into America and England, and shows, from a study of its distribution, its parasites, and the historical evidence, that the insect was probably introduced into England, and not more than three or four years ago.

CHARLES V. RILEY. Poisonous Insects.

Reference Handbook of the Medical Sciences, v, 1887, pp. 741-760, figures 2971-3020.

An exhaustive and illustrative review of species in all orders which secrete a poison injurious to man, together with descriptions of their life histories, the manner in which injury is inflicted, and the remedies indicated.

CHARLES V. RILEY. The Problem of the Hop Plant-Louse (*Phorodon humuli* Schrank) in Europe and America.

Report British Ass. Adv. Sci., 1887, pp. 750-753.

Printed also as a separate.

Gives a history of what has been discovered in the life history of this species; a statement of its migratory habits; its winter home; methods of checking its increase, and comments skeptically on the differences of habits recorded in England as to wintering.

CHARLES V. RILEY. On the Luminous Larviform females in the Phengodini.

Report British Ass. Adv. Sci., 1887, pp. 760-761.

Printed also as a separate.

Records recent studies and discoveries on this subject by the author and others. Describes several of the species and their habits, and suggests the significance from an evolutionary standpoint of the great differentiation of the sexes.

CHARLES V. RILEY. On *Icerya purchasi*, an insect injurious to Fruit Trees.

Proc. British Ass. Adv. Sci., 1887, p. 767. (Separate, 1 p.)

Discusses the synonymy, geographical distribution over three continents, and original home of the species; mentions the more recent and more approved remedies which have been used.

CHARLES V. RILEY. The Hessian Fly in England. Its origin; its past; its future.

The Times (London), October 12, 1887.

Discusses fully the three topics: (1) When was the Hessian fly introduced into England? (2) From what country was it introduced? (3) What may be expected of it in future? He argues that it has been introduced within the last few years; that it came into England from Europe, and not from the continent of America, and decides that English farmers have little to fear from the future injury of the species. He also discusses the general laws governing the importation of animals and plants from Europe into America and *vice versa*.

CHARLES V. RILEY. Importation of Plants into Germany.

Gardener's Monthly, XXIX, October 1887, p. 314.

Editorial statement, including correspondence by the author with the authorities in Germany, in reference to the possibility of introducing the *Phylloxera* on roots of plants other than grape-vine. Modification of the German laws induced by such correspondence.

CHARLES V. RILEY. The Problem of the Hop Plant-Louse fully solved.

Mark Lane Express (London), LVII, October 31, 1887, p. 1392.

Full life history of the species, its migrations, mode of hibernation, etc. From the *Gardener's Chronicle*, October 22, 1887.

CHARLES V. RILEY. On the larval habits of *Lixus*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 33.

Short mention of the breeding habits of *Lixus macer* and *L. parvus*, the latter forming a gall on the stems of *Amelanchia*, and, incidentally, the girdling habits of *Pediscus obfuscata*, Riley.

CHARLES V. RILEY. On the larvæ and pupæ of *Aphorista vittata* and *Epipocus punctatus*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 37.

Comparison of the earlier stages of these two Endomychid beetles.

CHARLES V. RILEY. On the food-habits of the larva of *Feniseca tarquinius*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 37.

Enumeration of the Aphids upon which the larva of *Feniseca* has been observed to feed.

CHARLES V. RILEY. Notes on *Phengodes* and *Zarhipis*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, pp. 62, 63.

Enumerates the material of the luminous larvæ or larviform females of the two genera in his possession, and classifies the same according to structural characters in three groups, those of the third group probably belonging to a third genus. Some hitherto overlooked characters are mentioned, and particularly a pair of small spiracular or spiracle-like orifices on the dorsal sutures between joints 4-11, and normally quite hidden by the telescoping of the joints. Their nature is not known, but they may be olfactory organs.

CHARLES V. RILEY. Notes on the life-history of *Egeriæ*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 85.

The species discussed are *Melittia gloriosa*, bred from the roots of *Rhus laurina* in southern California; *Egeria impropria*, bred from strawberry roots in southern California; *Phemonö 5-caudata*, from roots of a grafted Japan persimmon in Florida; *Sciapteron robinæ* and *Egeria albicornis* from *Salix californica* in southern California; *Egeria pyri* from apple-trees, District of Columbia.

CHARLES V. RILEY. Color-variation in the larva of *Apraulis vanillæ*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 85.

Characterization of larvæ found at Los Angeles, California, which are in marked contrast as to coloration with the form from the Eastern States.

CHARLES V. RILEY. Miscellaneous Insects.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 86.

Exhibition of, and short remarks on, the following insects: *Eumenia atala* and its earlier stages; *Cloantha derupta* and its larva; *Dendrotettix*, a new genus of *Aceridiæ*.

CHARLES V. RILEY. Further Notes on *Phengodes* and *Zarhipis*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, pp. 86, 87.

Comparison of the larva and larviform female of *Zarhipis* with those of *Phengodes*, and notes on the pseudo-pupa state and female of *Zarhipis*.

CHARLES V. RILEY. Notes on the eversible glands in larvæ of *Orgyia* and *Parorgyia*, with notes on the synonymy of species.

Proc. Ent. Soc. Washington, I, No. 2, 1888, pp. 87, 88.

Calls attention to the persistence of the glands on dorsal segments 9 and 10 in the larvæ of all species of both genera, and suggests that they are probably scent organs. *P. obliquata* is probably synonymous with *leucophæa*, and *clintoni* with *achatina*, which most probably has some other synonyms.

CHARLES V. RILEY. Further Remarks on *Phengodes*.

Proc. Ent. Soc. Washington, I, No. 2, 1888, pp. 88-89.

Exhibition of a female of *Phengodes laticollis* from North Carolina. Comparison of this larva with the author's original figure in Le Barron's fourth report on the insects of Illinois, and with the true larva.

CHARLES V. RILEY. Interesting Lepidoptera.

Proc. Ent. Soc. Washington, I, No. 2, 1888, p. 89.

Exhibition of, and short remarks on, a *Syntomeida* from southern Florida and a silvery white moth of uncertain systematic position from the same locality, and which is remarkable on account of certain long strings of hairs which issue from the body and are welded together by the ovipositor in the death struggle.

CHARLES V. RILEY. The Mulberry Silk-Worm; being a Manual of Instructions in Silk-Culture.

U. S. Department of Agriculture, Division of Entomology, Bulletin No. 9, Seventh Revised Edition, April, 1888.

A reprint of the Sixth Edition.

CHARLES V. RILEY. Catalogue of the Exhibit of Economic Entomology at the World's Industrial and Cotton Centennial Exposition, New Orleans, 1884-'85.

Department of Agriculture, Division of Entomology, May, 1888, pp. 1-95.

A reprint from the plates of the first edition issued in 1884.

CHARLES V. RILEY. Elm Tree Depredators.

Press and Register (Newark, New Jersey), May 10, 1888.

Report of an address before the Newark Board of Trade. A popular account, principally describing the history of the imported Elm Leaf Beetle, and the means to be used against it. Arsenical poisons are most reliable.

CHARLES V. RILEY. The British Pest. Worthlessness of the Sparrow as an Insect-killer.

National Tribune, April 26, 1888.

Gives, first, the result of an examination of the stomach contents of 522 sparrows, of which 92 only, or 17.6 per cent., contained any insects. These insects examined by the author showed a large preponderance of innocuous or actually beneficial species. All are such as can be readily picked up by the birds in their search for their more usual vegetable food. A review of the literature is then given, showing that the general results attained agree with the author's own conclusions, which are that the bird is not only useless, but actually "destructive," as termed by Dr. Merriam, and is essentially graminivorous, not insectivorous. The paper contains the substance of a communication made by the author to the Biological Society of Washington.

CHARLES V. RILEY. On the Original Habitat of *Icerya purchasi*.

Pacific Rural Press, XXXV, May 12, 1888, p. 425.

A review of the efforts made by the author to fix the original habitat of the species, and confirmation of the original conclusion that Australia is probably its true home. Study of the original types of *I. sacchari* in Signoret's collection at Paris, and decision that it is distinct from *purchasi*.

CHARLES V. RILEY. Systematic Relations of *Platysyllus*, as determined by the larva.

Scientific American Supplement, XXV, June 2, 1888, pp. 10356-10358. Four figures.

A complete review of the literature of the subject, and of the opinions held as to its systematic position. Details the recent studies made by Dr. Horn and the author, and freely endorses Dr. Horn's view of the coleopterous nature of the insect, adding additional facts to confirm the same.

CHARLES V. RILEY. Report of the Entomologist.

Report of the Commissioner of Agriculture for 1887, June, 1888, pp. 48-179. Plates I-VIII.

Contains the following: Introduction by C. V. Riley. A general review of the work of the year, and comments on the articles by special agents, etc. The Chinch Bug (*Blissus leucopterus* Say), by L. O. Howard, assistant, with plates I and III, pp. 51-58. The Codling Moth (*Carpocapsa pomonella* L.), by L. O. Howard, with plate II, pp. 88-115. Silk Culture; report of the year's operations, made to the Entomologist, by Philip Walker, agent in charge, pp. 115-122, plates VII and VIII. Reports of agents. Report on the Gas Treatment for Scale Insects, by D. W. Coquillett, special agent, pp. 123-142, plates IV-VI. Report on Experiments against Scale Insects, by Albert Koebele, special agent, pp. 143-147. Report on the Season's Observations, and especially upon Corn Insects, by F. M. Webster, special agent, pp. 147-154. Report upon the Insects of the Season in Iowa, by Herbert Osborn, special agent, pp. 154-164. Report on the Season's Observations in Nebraska, by Lawrence Bruner, special agent, pp. 164-170. Report on Experiments in Apiculture, by N. W. McLain, apicultural agent, pp. 170-178.

W. E. D. SCOTT. On the Avifauna of Pinal County, with remarks on some Birds of Pima and Gila Counties, Arizona (with annotations by J. A. Allen).

The Auk, v, pp. 159-168.

Compared with material in the National Museum.

NEWTON P. SCUDDER. The Salt-Halibut Fishery, with especial reference to that of Davis' Straits.

The Fisheries and Fishery Industries of the United States, Section V, vol. I, 1887, pp. 90-119.

HENRY SEEBOHM. The | Geographical Distribution | of the Family | Charadriidæ, | of the | Plovers, Sandpipers, Snipes, | and their Allies. | By | Henry Seebohm, | Author of "Siberia in Europe," "Siberia in Asia," "Catalogue of the Birds in the British Museum" (vol. v), | "A History of British Birds, with coloured Illustrations of their Eggs," etc. | [Wood-cut.] London: | Henry Sotheran & Co., | 136 Strand, W. C., and 36 Piccadilly, W. | Manchester: 49 Cross Street.

HENRY SEEBOHM.—Continued.

xxx, 524 pp., 4to. Twenty-one colored plates, and numerous wood-cuts in the text.

For the preparation of this great monograph Mr. Seebohm borrowed quite a number of rare species from the U. S. National Museum. Plate xvii is drawn from a specimen belonging to the Museum.

GEORGE B. SENNETT. Notes on the *Peucea ruficeps* Group, with Description of a New Subspecies.

The Auk, v, pp. 40-42.

Described as a new subspecies, *Peucea ruficeps scottii*. Compared with material in the U. S. National Museum.

GEORGE B. SENNETT. Description of a New Species and Two New Subspecies of Birds from Texas.

The Auk, v, pp. 43-46.

Psaltiriparus lloydi described as a new species, and *Nyctidromus albicollis merrilli* and *Parus carolinensis agilis* as new subspecies. Compared with material in the U. S. National Museum.

GEORGE B. SENNETT. Dichromatism in the Genus *Nyctidromus*.

The Auk, v, pp. 205, 206.

Based in part on specimens in the U. S. National Museum.

GEORGE B. SENNETT. A New Form of Clapper Rail.

The Auk, v, pp. 305-306.

Described as a new subspecies, *Rallus longirostris scottii*. Compared with specimens in the U. S. National Museum.

GEORGE B. SENNETT. An addition to the list of N. A. Birds.

The Auk, v, p. 319.

Rallus longirostris caribæus recorded as new to the North American fauna. Compared with specimens in the U. S. National Museum.

R. BOWDLER SHARPE. Catalogue | of the | Passeriformes, | or | Perching Birds, | in the | Collection | of the | British Museum. | — | Fringilliformes: Part III. | Containing the Family | Fringillidæ. | By | R. Bowdler Sharpe. | London: | Printed by Order of the Trustees. | 1888.

xv, 872 pp., 8vo. Sixteen colored plates.

A full monograph of the family of Finches, during the preparation of which the author borrowed material from the collection of the U. S. National Museum.

R. W. SHUFELDT. Something about Jack-Rabbits.

The Swiss Cross, II, No. 1, July, 1887, pp. 17-19. One figure in text.

A popular account of the author's hunting *Lepus callotis* in New Mexico and elsewhere, giving some of the habits of the animal, and a full-page figure of a "Jack Rabbit" copied from a photograph. The specimens upon which the paper is based are now in the collection of the Department of Mammals in the U. S. National Museum.

R. W. SHUFELDT. Observations upon the Habits of *Micropus melanoleucus*, with Critical Notes on its Plumage and External Characters.

The Ibis, London, April, 1887, pp. 151-158. One colored plate.

This paper is chiefly descriptive of collecting the White-throated Swift in New Mexico, with observations upon its habits, etc. In writing the article the author was assisted by material kindly loaned him by Mr. Robert Ridgway from the ornithological collection of the Smithsonian Institution. Upon some of the specimens taken by Dr. Shufeldt in New Mexico he found a large and new species of parasite, which was subsequently described in the *Proceedings of the Zoological Society of London*.

R. W. SHUFELDT. A Critical Comparison of a Series of Skulls of the Wild and Domesticated Turkeys (*M. g. mexicana* and *M. g. domestica*).

Jour. Comp. Med. and Surg., VII, No. 3, Art. xx, July, 1887, pp. 207-222. Seven text figures.

In this contribution the very striking differences between the typical skulls of wild turkeys and domesticated ones are pointed out in detail, and shown in a series of life-size figures. Several notable papers by Mr. Ridgway, of the National Museum, on *Meleagris* were used by the author in his work; and the material upon which it is based will eventually be turned in to the Smithsonian collection.

R. W. SHUFELDT. *Geococcyx californianus*. A correction.

The Auk, IV, No. 3, July, 1887, pp. 254, 255.

R. W. SHUFELDT. Individual Variation in the Skeletons of Birds, and other matters.

The Auk, IV, No. 3, July, 1887, pp. 265-268. Two text figures.

R. W. SHUFELDT. On the Tongue in the Humming-bird.

Forest and Stream XXVIII, No. 25, July 14, 1887, p. 351. Three text figures.

An illustrated article supporting MacGillivray's views of the structure of the tongue in the

R. W. SHUFELDT—Continued.

Trochili, and exposing the erroneous views still entertained by some ornithologists, that the humming-bird can suck the sweets of flowers through a *tubular tongue*. The author presents an account of his dissections of the lingual apparatus in these birds. Alcoholic specimens, as well as fresh material, were utilized for the purpose; the former, still in the author's possession, will become the property of the U. S. National Museum.

R. W. SHUFELDT. Contributions to the Comparative Craniology of the North American Indians.—The Skull in the Apaches.

Journal of Anatomy and Physiology, London, XXI, n. s. I, Part IV, Art. 1, July, 1887, pp. 525-535. Three text figures.

R. W. SHUFELDT. The Wanton Destruction of the Florida Heronries.

Science, x, No. 233, July 22, 1887, pp. 47, 48.

R. W. SHUFELDT. The Whip-tailed Scorpion.

Forest and Stream, XXIX, No. 1, July 28, 1887, p. 3. One text figure.

Specimens of this insect were sent by the author as contributions to the entomological collection of the U. S. National Museum, they having been obtained for him by collectors in New Mexico and Arizona. In the paper about them a life-size figure is given, with a brief account of their habits, the Whip-tailed Scorpion being the *Thelyphonus giganteus* of arachnidists, a large spider-like scorpion of the southern United States.

R. W. SHUFELDT. The dermo-tensor patagii muscle.

Science, x, No. 234, July 29, 1887, p. 57. Three text figures.

R. W. SHUFELDT. The Gila Monster.

Forest and Stream, XXIX, No. 2, August 24, 1887, p. 24. One text figure.

R. W. SHUFELDT. Arrow Release among the Navajos.

The American Naturalist, XXI, No. 8, August, 1887, pp. 784-786.

R. W. SHUFELDT. The Pied Duck.

Forest and Stream, XXIX, No. 4, August 18, 1887, p. 64. One figure.

A number of duck hunters at different times having written the author that Pied Ducks (*Camptolaimus labradorius*) were occasionally seen on the Atlantic coast, this article was written to draw attention to the matter, and to prevent specimen from being destroyed or not properly utilized after shot. The mounted specimen of the duck in the Smithsonian Institution was used to make the figure illustrating the paper.

R. W. SHUFELDT. A Chapter on Pterylography.

Forest and Stream, XXIX, No. 5, August 25, 1887, pp. 81, 85. Five text figures.

R. W. SHUFELDT. The American Badger and its Congeners.

Forest and Stream, XXIX, No. 9, September 22, 1887, pp. 162-164. Three figures in text.

A review of the Badgers in different parts of the world, with a figure of *T. americana* from a photograph.

R. W. SHUFELDT. A Word about Opossums.

Forest and Stream, XXIX, No. 11, October 6, 1887, pp. 203, 204. One text figure.

R. W. SHUFELDT. Notes on *Melanerpes f. bairdi* in New Mexico.

The Auk, IV, No. 4, October, 1887, pp. 345, 346.

R. W. SHUFELDT. A Review of the Muscles used in the Classification of Birds.

Jour. of Comp. Med. and Surg., VIII, No. 4, October, 1887, pp. 321-344. Thirteen text figures.

R. W. SHUFELDT. The Armadilloes.

Forest and Stream, XXIX, No. 12, October, 1887, pp. 222-224. One text figure.

This and former articles similar to it purport to illustrate through the columns of "Forest and Stream," the "Provisional List" of the Mammalia, published by the Curator of Mammals in the U. S. National Museum, and are chiefly designed to give accurate accounts of the United States mammals; to incite fuller studies of their habits and natural history on the part of hunters and explorers; to show the necessity of the preservation of a number of forms, as the buffalo, beaver, mountain goat, and elk, now rapidly becoming extinct. Finally, to induce hunters to save such material as far as possible, and to send rare skins and skeletons and alcoholics to museums and especially to the U. S. National Museum, where they may be studied and made use of.

R. W. SHUFELDT. The Manatees.

Forest and Stream, XXIX, No. 13, October 20, 1887, pp. 244, 245. Four text figures.

R. W. SHUFELDT. Cetaceans of the United States.

Forest and Stream, XXIX, No. 14, October 27, 1887, pp. 263-265. Nine text figures.

R. W. SHUFELDT. On a Collection of birds' Sterna and Skulls, collected by Dr. Thomas H. Streets, U. S. Navy.

Proc. U. S. Nat. Mus., 1887, pp. 376-387. Five text figures.

While Dr. Streets, of the Navy, was serving as surgeon and naturalist of the U. S. steamer

R. W. SHUFELDT—Continued.

Patterson in the South Pacific he made a very excellent collection of birds' sterna and skulls, which he presented to the author, who in turn described and figured them in the present paper, and deposited the specimens in the collections of the U. S. National Museum. Several figures of sea-fowl and other forms are given.

R. W. SHUFELDT. The Peccary, with Introductory Notes on the Order Ungulata.

Forest and Stream, xxx, No. 1, January 26, 1888, pp. 4-6. Fourteen text figures.

R. W. SHUFELDT. Comparative Data from 2,000 Indian Crania in the U. S. Army Medical Museum.

Jour. of Anat. and Phys., London, xxii, n. s., II, Part 2, Art. v, January, 1888, pp. 191-214.

R. W. SHUFELDT. The American *Cervidæ*.

Forest and Stream, xxx, No. 5, February 23, 1888, pp. 84-86. Ten text figures.

R. W. SHUFELDT. The Prong-horn Antelope.

Forest and Stream, xxx, No. 8, March 15, 1888, pp. 144, 145. One text figure.

R. W. SHUFELDT. Observations on the Pterylosis of certain *Picidæ*.

The Auk, v, No. 2, April, 1888, pp. 212-218. Five text figures.

R. W. SHUFELDT. On the Skeleton in the genus *Sturnella*, with Osteological Notes upon other North-American *Icteridæ*, and the *Corvidæ*.

Jour. of Anat. and Phys., London, xxii, n. s., II, April, 1888, pp. 309-350. Plates xiv and xv.

R. W. SHUFELDT. The American Buffalo.

Forest and Stream, xxx, No. 21, June 14, 1888, p. 411. One text figure.

CHARLES T. SIMPSON. Contributions to the Mollusca of Florida.

Proc. Davenport Academy of Sciences, v, 1887, pp. 45-56.

Specimens were named and information furnished by the Department of Mollusks to Mr. Simpson, in connection with the preparation of this paper.

HUGH M. SMITH, WILLIAM PALMER and.

(See under William Palmer.)

JOHN B. SMITH. A new Genus and Species of *Arotiida*.

Entomologica Americana, III, July, 1887, pp. 79, 80.

Describes as new *Cerathosia tricolor* Smith, n. gen. et sp., from Texas.

JOHN B. SMITH. *Callimorpha*.

Entomologica Americana, III, August, 1887, p. 88.

Requests collectors to try and obtain the early stages and breed extensively to settle specific distinctness of the forms described.

JOHN B. SMITH. Cockroaches.

Entomologica Americana, III, August, 1887, p. 88.

Calls attention to some published statements of the uses of these insects in medicine.

JOHN B. SMITH. The Species of *Callimorpha*.

Entomologica Americana, III, September, 1887, pp. 102, 103.

Statements of the results of a study of this genus before the Ent. Club A. A. A. S., forming part of its Proceedings.

JOHN B. SMITH. The Species of *Euerythra*.

Proc. U. S. Nat. Mus., x, September, 1887, pp. 335-337. Plate XIII.

Describes as new *E. trimaculata*, from Texas, and gives the differences between the forms.

JOHN B. SMITH. The North American Species of *Callimorpha* Latr.

Proc. U. S. Nat. Mus., x, September, 1887, pp. 338-353. Plates XIII and XIV.

Gives a review of the literature of the genus, and a synopsis, followed by detailed descriptions of the species, of which *C. lactacata* and *C. suffusa* are described as new.

JOHN B. SMITH. Proceedings of the Ent. Club of the A. A. A. S., at the New York meeting, August, 1887.

Entomologica Americana, III, September, 1887, pp. 101-108 and 121-123.

Full minutes of the meeting, prepared by the author as secretary, and published by direction of the Club.

JOHN B. SMITH. What makes a species in the genus *Arctia*.

Entomologica Americana, III, September, 1887, pp. 109-112.

Analyzes the characters of maculation, points out their constancy or variability, and gives a rough sketch of a proposed basis for a natural arrangement.

JOHN B. SMITH. A new Sphinx.

Entomologica Americana, III, November, 1887, p. 153.

Describes *Sphinx coloratus* Smith as a new species from Colorado.

JOHN B. SMITH. Notes on *Diludia* G. & R.

Entomologica Americana, III, November, 1887, p. 154.

Reviews the characters of the genus, and shows why the American species referred to it can not remain in it. Proposes the term *Chlœnogramma* with *jasminearum* as type.

JOHN B. SMITH. Notes on *Callimorpha*.

Canadian Entomologist, XIX, December, 1887, pp. 235-239.

Gives a chronological review of the work and publications on this subject, and comments on a paper by Mr. H. H. Lyman in the "Canadian Entomologist" for October. Gives also synonymical list of the species.

JOHN B. SMITH. Some Remarks on Arctiid Structures.

Entomologica Americana, III, January, 1888, p. 199.

Calls attention to the structure of the tarsi and venation. In abstract of Proc. Ent. Soc. Washington, November, 1887.

JOHN B. SMITH. Museum Pests.

Entomologica Americana, III, January, 1888, p. 200.

A brief statement of the results of experiments with repellants, and some notes on the habits of the species. In abstract of Proc. Ent. Soc. Washington, December, 1887.

JOHN B. SMITH. New Genera and Species of North American Noctuidæ.

Proc. U. S. Nat. Mus., X, January, 1888, pp. 450-479.

Describes as new the following: *Agrotis binominalis*, *A. crenulata*, *A. confusa*, *A. tepperi*, *A. sorror*, *A. proclivis*, *A. albicosta*, *A. oblongistigma*, *A. flavidens*, *A. brevipennis*, *A. flavicollis*, *A. obesula*, *A. sponsa*, *A. finis*, *A. luteola*, *A. serricornis*, *A. letrica*, *A. medialis*, *A. extranea*, *A. trifasciata*, *A. bifasciata*, *A. orbicularis*, *A. rufula*, *A. pallipennis*, *A. solitaria*, *Mamestra subapicalis*, *M. lepidula*, *M. prodeniformis*, *M. canadensis*, *M. obscurior*, *M. rectilinea*, *M. vanmedia*, *M. incurva*, *M. variolata*, *M. minorata*, *M. pulverulenta*, *M. obscura*, *Scotogramma* n. gen., *S. perplexa*, *S. inconcinna*, *S. umbrosa*, *Copimamestra curialis*, *Ulonche* n. gen., *U. fasciata*, *Taeniocampa columbia*, *T. utahensis*, *T. suffusa*, *T. obtusa*, *T. pectinata*, *T. terminata*, *T. subterminata*, *Perigrapha inferior*, *Trichoclea edwardsii*, *Orthodes irrorata*.

JOHN B. SMITH. On the Position of the Genus *Pleocoma*, Lec., in the Lamellicorn System. By Dr. Gerstaecker.

Entomologica Americana, III, February, 1888, pp. 202-211.

A translation of the above paper from the German in Stett. Ent. Zeit., 1883, pp. 436-450, with brief note by the translator. (Translation.)

JOHN B. SMITH. Moths New to our Fauna.

Canadian Entomologist, XX, March, 1888, p. 56.

Criticizes the recent addition to our faunal lists of some subtropical stragglers occasionally found in it.

JOHN B. SMITH. Larva of *Aphorista vittata*.

Proc. Ent. Soc. Washington, I, March, 1888, p. 33. One plate.

Calls attention to the habits and peculiar structure of this larva.

Read before the Entomological Society of Washington, December, 1885.

JOHN B. SMITH. The Odoriferous Apparatus in Lepidoptera.

Proc. Ent. Soc. Washington, I, March, 1888, pp. 38-41.

Abstract of a paper by Professor von Dalla Torre, "Die Duftapparate der Schmetterlinge" *Kosmos*, XVII, pp. 354-364 and 410-422, with notes on American forms showing similar structures.

Read before the Entomological Society of Washington, February, 1886.

JOHN B. SMITH. Notes on *Attacina* and *Ceratocampina*.

Proc. Ent. Soc. Washington, I, March, 1888, p. 42.

Points out the family and subfamily characters of these groups.

Read before the Entomological Society of Washington, March, 1886.

JOHN B. SMITH. Some structural features of the *Saturniidae*.

Proc. Ent. Soc. Washington, I, March, 1888, p. 45.

Defines the family, and points out what he deems the important characters.

Read before the Entomological Society of Washington, April, 1886.

JOHN B. SMITH. The Systematic position of *Quadrima*, Grt.

Proc. Ent. Soc. Washington, I, March, 1888, pp. 51, 52.

Points out the characters and relationships of this family.

Read before the Entomological Society of Washington, July, 1886.

JOHN B. SMITH. Note on *Dynastes tityus*.

Proc. Ent. Soc. Washington, I, March, 1888, p. 54.

Records the abnormal abundance of these beetles in some Southern States, and that the stench had become a nuisance.

Read before the Entomological Society of Washington, September, 1886.

- JOHN B. SMITH. Sexual brush in *Schinia marginata*.
Proc. Ent. Soc. Washington, 1, March, 1888, p. 55.
 Describes a peculiar brush of hair at the base of abdomen and resting in a groove between the dorsal and ventral segments.
 Read before the Entomological Society of Washington, September, 1886.
- JOHN B. SMITH. Notes on *Cressonia*, *Eurythra*, and *Callimorpha*.
Proc. Ent. Soc. Washington, 1, March, 1888, pp. 79, 80.
 Describes the antennal structure of *Cressonia* and makes some remarks on the specific rank of the forms found in the other genera.
 Read before the Entomological Society of Washington, March, 1887.
- JOHN B. SMITH. Classification of the *Smerinthinae*.
Proc. Ent. Soc. Washington, 1, March, 1888, p. 83.
 Gives an outline of a proposed arrangement of the species and genera.
 Read before the Entomological Society of Washington, May, 1887.
- JOHN B. SMITH. Structural features of the *Sphingidae*.
Proc. Ent. Soc. Washington, 1, March, 1888, pp. 92, 93.
 Comparative references to the genitalia of the male in some genera.
 Read before the Entomological Society of Washington, August, 1887.
- JOHN B. SMITH. The species of *Diludia*.
Proc. Ent. Soc. Washington, 1, March, 1888, p. 103.
 States that after examination of types in the Philadelphia collection he finds that the species, *jasminearum*, does not belong to the genus.
 Read before the Entomological Society of Washington, October, 1887.
- JOHN B. SMITH. Some Arctiid Structures.
Proc. Ent. Soc. Washington, 1, March, 1888, pp. 107, 108.
 Notes on the venation and on the structure of the claws in this family.
 Read before the Entomological Society of Washington, November, 1887.
- JOHN B. SMITH. Some Observations on Museum Pests.
Proc. Ent. Soc. Washington, 1, March, 1888, pp. 113-116.
 Notes on all the species observed by him in collections, with methods of prevention and cure.
 Read before the Entomological Society of Washington, December, 1887.
- JOHN B. SMITH. A note on *Zygæna*.
Societas Entomologica, III, April, 1888, p. 1.
 Points out an error in characterization of the genus *Zygæna* made by all the European Lepidopterists to date.
- JOHN B. SMITH. An Introduction to a Classification of the North American Lepidoptera.
Entomologica Americana, IV, April, 1888, pp. 9-13.
 Continued from vol. I of the same journal and reviewing the *Sesiidae*. Gives a brief description of all genera.
- JOHN B. SMITH. An Introduction to a Classification of the North American Lepidoptera.
Entomologica Americana, IV, May, 1888, pp. 27, 28.
 Continuation of the above, and covering the families *Thyriidae* and *Heterogynidae*.
- JOHN B. SMITH. (Abstract of Proceedings of the Entomological Society of Washington, January 5, 1888, and February 2, 1888.)
Entomologica Americana, IV, April, 1888, p. 20.
 Condensed from the author's minutes as Secretary.
- JOHN B. SMITH. (Abstract of Proceedings of the Entomological Society of Washington, March 1 and April 6, 1888.)
Entomologica Americana, IV, May, 1888, p. 40.
- JOHN B. SMITH. (Abstract of Proceedings of the Entomological Society of Washington, May 3, 1888.)
Entomologica Americana, IV, June, 1888, p. 60.
- JOHN B. SMITH. William W. Hill.
Entomologica Americana, III, May, 1888, pp. 235, 236.
 Obituary note and brief life-history.
- JOHN B. SMITH. Revision of the Species of *Lachnosterna* of America north of Mexico, by George H. Horn, M. D. (Review.)
Entomologica Americana, IV, June, 1888, pp. 52-56.
 Gives a brief review of the above work, and gives also a synonymic list of the species, with localities.

LEONHARD STEJNEGER. Notes on the Northern Palearctic Bullfinches.

Proc. U. S. Nat. Mus., x, 1887, pp. 103-110.

Shown that *Pyrrhula cassini* Baird, as the older name, must take precedence over *P. cineracea* Cabanis; also that *P. rosacea* Seeböhm is identical with *P. griseiventris* Lafr.

LEONHARD STEJNEGER. Contributions to the Natural History of the Commander Islands. No. 7. Revised Annotated Catalogue of the Birds inhabiting the Commander Islands.

Proc. U. S. Nat. Mus., x, 1887, pp. 117-145. Plates VII-IX.

Enumerated one hundred and forty-three species. A Flycatcher from Bering Island named conditionally *Butalis pallescens*.

LEONHARD STEJNEGER. Review of Japanese Birds. v. Ibises, Storks, and Herons.

Proc. U. S. Nat. Mus., x, 1887, pp. 271-319. Plate x.

A full synopsis of the Japanese species of the order *Herodiones*. *Demigretta ringeri* described as new, and *Platalea swinhoei* and *Ardeola tutula* named conditionally. Two new subgenera established, viz, *Nannocnus* and *Phoyx*.

LEONHARD STEJNEGER. On the Systematic Name of the Kamtschatkan and Japanese Carrion Crow.

Proc. U. S. Nat. Mus., x, 1887, pp. 320-321.

The name of the Kamtschatkan and Japanese Carrion Crow should stand as *Corvus corone orientalis*.

LEONHARD STEJNEGER. Notes on *Psittirostra psittacea* from Kauai, Hawaiian Islands.

Proc. U. S. Nat. Mus., x, 1887, pp. 389-390.

Description of specimens received from Mr. Valdemar Knudsen (Acc. 19325).

LEONHARD STEJNEGER. Further Contributions to the Avifauna of the Liukiu Islands, Japan, with Descriptions of New Species.

Proc. U. S. Nat. Mus., x, 1887, pp. 391-415. Plates XXI, XXII.

A full report upon a collection received from the authorities of the Educational Museum, Tokio. The following species are described as new: *Porzana phaeopyga*, *Euryzona sepiaria*, *Turtur stimpsoni*, and quite a number of species are added to the Japanese fauna. (Acc. 19072.)

LEONHARD STEJNEGER. Review of Japanese Birds. vi. The Pigeons.

Proc. U. S. Nat. Mus., x, 1887, pp. 416-429. Plate XXII.

A full synopsis of the Japanese species of the family *Columbidae*, with synonymies, descriptions, etc. *Janthoenas nitens* described as new, from a specimen lent by the authorities of the St. Petersburg Academy of Sciences; and *Janthoenas versicolor* (Kittl.), from the same source, for the first time properly described.

LEONHARD STEJNEGER. On a Collection of Birds made by Mr. M. Namiye in the Islands of Idzu, Japan.

Proc. U. S. Nat. Mus., x, pp. 482-487.

Report on a collection received from the authorities of the Tokio Educational Museum, containing, among others, the new species *Turdus celanops* Stejn. (Acc. 19478.)

LEONHARD STEJNEGER. Olphe-Galliard's Ornithology of Western Europe.

The Auk, iv, p. 336.

Review of Léon Olphe-Galliard's work.

LEONHARD STEJNEGER. *Proptagialis cucullaris*.

The Auk, v, 1888, pp. 120-123.

Letter to the editors of "The Auk" in reply to a previous paper by Dr. R. W. Shufeldt.

LEONHARD STEJNEGER. Palmén's Contributions to the Knowledge of the Bird Fauna of the Siberian Coasts of the Arctic Sea.

The Auk, v 1888, pp. 306-311.

A lengthy review of Professor Palmén's work, with additions and corrections, based upon material in the U. S. National Museum.

LEONHARD STEJNEGER. Henry James Stovin Pryer.

The Auk, v, 1888, pp. 332-333.

Obituary notice.

LEONHARD STEJNEGER. (Obituary Notice of Prof. Modest Bogdanow.)

The Auk, v, 1888, pp. 333-334.

LEONHARD STEJNEGER. A List of Birds hitherto reported as occurring in the Liukiu Islands, Japan.

Zeitschr. Ges. Ornith., iv, 1887, pp. 166-176. Plate II.

Enumerates sixty-three species. The colored plate represents *Pericrocotus tegimæ* Stejn. drawn by the author from the type specimen in the U. S. National Museum.

LEONHARD STEJNEGER. On the Type Specimen of *Euryzona eurizonoides*.

Proc. Boston Soc. Nat. Hist., XXIII, pp. 461-464.

The type of *Euryzona eurizonoides* is in the Museum of the Boston Society of Natural History, from which it was borrowed for comparison with the new Japanese species described by the author as *Euryzona sepiaria*.

LEONHARD STEJNEGER. Pars Propatagialis Musculi cucularis.

Science, x, August 5, 1887, pp. 70-71, figs. 1, 2.

Calls attention to the fact that the muscle in the bird-wing, described in a previous number as new by Dr. R. W. Shufeldt, is in reality a well-known muscle described by Fürbringer under the above name.

LEONHARD STEJNEGER. Diagnosis of a New Species of Thrush (*Turdus celanops* sp. nov.) from Japan.

Science, x, August 26, 1887, p. 108.

Preliminary diagnosis of the new species *Turdus celanops*, contained in a collection received by the U. S. National Museum from the authorities of the Tokio Educational Museum. (Acc. 19478.)

LEONHARD STEJNEGER. The British Marsh Tit.

Zoologist, 3d ser., xi, October, 1887, pp. 379-381.

Reprint of the author's paper in the "Proceedings of the U. S. National Museum," ix, 1886, pp. 200, 201, describing as new *Parus palustris dresseri* from the British Islands.

LEONHARD STEJNEGER. On the Shedding of the Claws in the Ptarmigan and Allied Birds.

Zoologist, 3d ser., xi, July, 1887, pp. 258-260.

Reprint of the author's paper in the "American Naturalist," xviii, pp. 774-776.

LEONHARD STEJNEGER. *Pyrrhula cassini* (Baird).

L. M. Turner's Contrib. Nat. His. Alaska, pp. 169-170.

This account of the status of *Pyrrhula cassini* was written in 1885 for Mr. Turner and incorporated by him in his report.

LEONHARD STEJNEGER. How the Great Northern Sea-cow (*Rytina*) became exterminated.

American Naturalist, xxi, December, 1887, pp. 1047-1054.

Maintains that *Rytina gigas* was exterminated in 1768. "It was simply due to man's greed, and he accomplished it within the short time of twenty-seven years."

LEONHARD STEJNEGER. Robert Ridgway's Nomenclature of Colors for Naturalists and Compendium of Useful Knowledge for Ornithologists. Boston, Little, Brown & Company, 1886.

Nature, 1887, p. 223.

Review of the above.

CHARLES H. TOWNSEND. Notes on the Natural History and Ethnology of Northern Alaska.

Report of the Cruise of the Revenue Marine Steamer Corwin, in the Arctic Ocean in the year 1885 (1887), by Capt. M. A. Healy, U. S. R. M., Commander, pp. 81-102. Four plates.

The birds of the Kowak River region are treated of on pp. 90-94, and those "obtained at various places between the Aleutian Islands and Kotzebue Sound" on pp. 98-101. A beautiful colored plate, by Robert Ridgway, representing *Plectrophenax hyperboreus*, from specimens in the U. S. National Museum, accompanies the reports. All the birds collected by Mr. Townsend during the cruise are in the Museum.

CHARLES H. TOWNSEND. Field Notes on the Mammals, Birds, and Reptiles of Northern California.

Proc. U. S. Nat. Mus., x, 1887, pp. 159-241. Plate v.

Birds, pp. 159-163 and 190-237. The whole material upon which these observations are based was collected by the author from 1883 to 1885 for the U. S. National Museum, while stationed in northern California as an assistant of the U. S. Fish Commission.

FREDERICK W. TRUE. Report on the Department of Mammals in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 79-84.

FREDERICK W. TRUE. Report on the Department of Comparative Anatomy in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 99-102.

FREDERICK W. TRUE. The Fisheries of the Great Lakes.

The Fisheries and Fishery Industries of the United States, II, 1887, Part XVII, pp. 633-673.

- FREDERICK W. TRUE. Description of a new species of Bat, *Vespertilio longicrus*, from Puget Sound.
Proc. U. S. Nat. Mus., x, December 17, 1886, pp. 6, 7.
- FREDERICK W. TRUE. Some Distinctive Cranial Characters of the Canada Lynx.
Proc. U. S. Nat. Mus., x, 1887, pp. 8, 9.
- FREDERICK W. TRUE. A note on *Vesperugo hesperus* (Allen).
Proc. U. S. Nat. Mus., x, November 21, 1887, p. 515.
- FREDERICK W. TRUE. The Pound-Net Fisheries of the Atlantic States.
The Fisheries and Fishery Industries of the United States, Section v, vol. i, 1887, pp. 595-609. Four plates.
- FREDERICK W. TRUE. The Alewife Fishery of Cape Cod.
The Fisheries and Fishery Industries of the United States, Section v, vol. i, 1887, pp. 670-673.
- FREDERICK W. TRUE. The Turtle and Terrapin Fisheries.
The Fisheries and Fishery Industries of the United States, Section v, vol. ii, 1887, pp. 493-503. One plate.
 (See also under Ludwig Kumlien.)
- LUCIEN M. TURNER. Forty-ninth Congress, first session, Senate, Mis. Doc. No. 155. Contributions | to the | Natural History of Alaska. | — | Results of investigations made chiefly in the Yukon | District and the Aleutian Islands; conducted | under the auspices of the Signal Service, | United States Army, extending from | May, 1874, to August, 1881. | Prepared under the direction of Brig. and Bvt. Maj. Gen. W. B. Hazen, Chief Signal Officer of the Army. By L. M. Turner. | — | No. II. Arctic Series of Publications issued in connection with the Signal Service, U. S. Army. With 26 plates. | — | Washington : | Government Printing Office. | 1886.
 pp. 226, 4to. Twenty-six plates.
 The Birds, forming Part v, occupy pp. 115-184; and pp. 184-196 are devoted to a special "List of the Birds of Alaska." The ornithological portion of the report is illustrated by ten colored plates by R. and J. L. Ridgway, representing thirteen species, from specimens in the U. S. National Museum. The collections upon which this report is based were made during the years 1874 to 1881 by the author for the Museum, while in Alaska as an observer in the U. S. Signal Service. Acknowledgments are made to Messrs. R. Ridgway and L. Stejneger for assistance during the preparation of the ornithological part of the report. Although printed in 1886, the report was not published until 1888.
- GEORGE VASEY. Contributions to the Natural History of the Commander Islands.
Proc. U. S. Nat. Mus., x, 1887, p. 153.
 Description of *Alopecurus stejnegeri*, a new species of grass from the Commander Islands.
- CHARLES D. WALCOTT. Report on the Department of Invertebrate Fossils (Paleozoic) in the U. S. National Museum, 1885.
Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 129-132.
- CHARLES D. WALCOTT. Note on the Genus *Archæocyathus* of Billings.
Amer. Jour. Sci., XXXIV, August 27, 1887, pp. 145, 146.
 A review of the history, description and meaning of this genus.
- CHARLES D. WALCOTT. Fauna of the "Upper Taconic" of Emmons, in Washington County, New York.
Amer. Jour. Sci., XXXIV, September, 1887, pp. 187-199. Plate 1.
 A description of fossils obtained in the Upper Taconic rocks of Emmons. Since the publication of this paper, the name "Taconic" has been dropped entirely by the author in describing the Lower Cambrian rocks.
- CHARLES D. WALCOTT. Section of Lower Silurian (Ordovician) and Cambrian Strata in Central New York, as shown by a deep well near Utica.
Proc. Amer. Assoc. Adv. Sci., XXXVI, December, 1887, p. 212.
 A description of the strata penetrated by the well. The entire depth of the well was 2,250 feet. It passed through 90 feet of rocks referred to the Hudson River group; 710 feet of rocks referred to the Utica shale; 350 feet to the Trenton limestone; unidentified, 180 feet; 260 feet to the Calcareous sand-rock; 410 feet to the Potsdam and pre-Potsdam sand-rock; 160 feet to the Archean.
- CHARLES D. WALCOTT. Discovery of Fossils in the Lower Taconic of Emmons.
Proc. Amer. Assoc. Adv. Sci., XXXVI, December, 1887, p. 213.
 Report of finding fossils in granular quartzite near Bennington, Vermont, and the discovery of fossils in the crystalline limestone near Pownal, Vermont. The quartzite is referred to the Lower Cambrian, and the limestone, overlying the schists, to the Lower Silurian group.

CHARLES D. WALCOTT. The Taconic System of Emmons, and the use of the name Taconic in Geologic Nomenclature.

Amer. Jour. Sci., XXXV, pp. 229-242, 307-327, 394-401. Thirteen figures and map.

Statement of principles of geologic nomenclature. Description of the Taconic area, including a brief historical review. Description of the geology as known at present, and as known to Dr. Emmons. In Part III the subject of nomenclature and the use of the name "Taconic" and "Cambrian" are discussed, a classification of the Cambrian rocks is given, and the conclusion reached that the name Taconic should be dropped in geologic nomenclature.

LESTER F. WARD. Report on the Department of Plants in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 135, 136.

LESTER F. WARD. Remarks on Lesquereux's criticisms of the Synopsis of the Flora of the Laramie Group.

Amer. Jour. Sci., XXXIV, 3d series, December, 1887, pp. 488, 489.

Points out the greater abundance of palms in the southern than in the northern (Fort Union) Laramie deposits, and defends the Senonian age of certain of the Credneria beds of Europe.

LESTER F. WARD. Remarks on Dr. Welling's paper on the Law of Malthus, read before the Anthropological Society of Washington, February 1, 1887.

The American Anthropologist, I, No. 1, January, 1888, pp. 21-23.

The Malthusian law applicable to the animal kingdom below man, as shown by Darwin, who has simply applied it to it, but not applicable to man himself, in consequence of the great development in him of the psychic faculty whereby he controls the rest of nature and makes himself an exception to its laws.

LESTER F. WARD. Review of W. C. Williamson: On the Organization of the Fossil Plants of the Coal Measures. Part XIII.

Amer. Jour. Sci., XXXV, 3d series, March, 1888, p. 256.

LESTER F. WARD. Review of C. T. Stockwell on The Evolution of Immortality or, Suggestions of an Individual Immortality based upon our Organic and Life History.

Public Opinion, Washington and New York, IV, March 24, 1888, p. 592.

LESTER F. WARD. Some Social and Economic Paradoxes.

Science, XI, April 13, 1888, pp. 172, 174-176.

Discusses and defends the following paradoxical propositions: (1) The artificial is superior to the natural; (2) The arbitrary control of the social forces is economical; (3) Reforms are chiefly advocated and brought about by those who have no personal interest in them; (4) Discontent increases with the improvement of the social condition; (5) The means of subsistence increases more rapidly than population; (6) Capital is more effective than labor in the production of wealth; (7) Wages are drawn from products, not from capital; (8) Profits rise with wages; (9) Prices fall as wages rise; (10) Rents rise with wages; (11) A reduction of the hours of labor tends to increase production; (12) The reduction of hours tends to increase wages.

CHARLES A. WHITE. Report on the Department of Invertebrate Fossils (Meso-Cenozoic) in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886). Part II, p. 133.

CHARLES A. WHITE. Contributions to the Paleontology of Brazil. (With Portuguese translation by Prof. Orville A. Derby.)

Archivos do Museu Nacional do Rio de Janeiro, VII, pp. 1-273. Plates 1-28.

Also published as a separate.

CHARLES A. WHITE. On the relation of the Laramie Group to earlier and later Formations.

Am. Jour. Sci., XXXV, 3d ser., June, 1888, pp. 432-438.

CHARLES A. WHITE. On the occurrence of later Cretaceous deposits in Iowa

Am. Geologist, I, No. 4, April, 1888, pp. 221-227.

CHARLES A. WHITE. Mountain Upthrusts.

Am. Naturalist, XXII, No. 258, May, 1888, pp. 399-408. Three figures.

CHARLES A. WHITE. On *Hindeastrea*, a new generic form of Cretaceous *Astræidæ*.

Geological Magazine, London, V, No. 8. New Series, No. 290, December 3, pp. 362-364.

THOMAS WILSON. Epitome of the History and Condition of the Science of Prehistoric Archaeology in Western Europe.

The American Antiquarian, IX, No. 6, November, 1887, pp. 335-342.

Reprinted in pamphlet form under title of "Epitome of Prehistoric Archaeology in Western Europe," with the following additional chapters: Chapter II. France—Paleolithic Age. Chapter III. Spain and Portugal. Chapter IV. Man in the Tertiary Period.

C. D. WOODS, W. O. ATWATER and.

(See under W. O. Atwater.)

H. C. YARROW. Report on the Department of Reptiles and Batrachians in the U. S. National Museum, 1885.

Report of the Smithsonian Institution, 1885 (1886), Part II, pp. 93, 94.

H. C. YARROW. Snake Bite and its Antidote.

Forest and Stream, xxx, Nos. 16-20, May 10, 17, 24, 31, and June 7, 1888.

H. C. YARROW. Bite of the Gila Monster.

Forest and Stream, xxx, No. 21, June 14, 1888, pp. 412-413.

H. C. YARROW. Treatment of Snake Bite.

Forest and Stream, xxx, No. 22, June 21, 1888, pp. 431-432.

SECTION V.

LIST OF ACCESSIONS TO THE U. S. NATIONAL MUSEUM DURING THE
YEAR ENDING JUNE 30, 1888.



LIST OF ACCESSIONS.

- ABBOTT, W. H. (U. S. Fish Commission), presented prehistoric stone implements and fragments of pottery (20055) and an iron shoe belonging to a post-hole digger, found near Chain Bridge, Maryland. (20088).
- ACEVADO, General José (Bogota, United States of Colombia), presented a specimen of "Faya Mapa"—a venomous serpent—killed near the mouth of the Magdalena River. 19703.
- ACKER, H. P. (Akron, Ohio), presented land and fresh water shells, from Summit County, Ohio. 20361.
- ADAIR, OLIVER BELTON (Washington, District of Columbia), presented Chinese and Japanese copper coins. 19411.
- ADAMS, A. F. (Smithsonian Institution), presented a badge worn by the "Governor's Greys," of Dubuque, Iowa, during the ceremonies attending the celebration of the one hundredth anniversary of the adoption of the Constitution of the United States, held in Philadelphia in the year 1887. 19646.
- ADAMS, CHARLES H. (Crab Orchard, Kentucky), sent a specimen of ore for examination and report. 20117.
- ADAMS, W. H. (Elmore, Peoria County, Illinois), presented prehistoric stone implements, sixty-two specimens, from Knox and Peoria Counties, Illinois. 20177, 20481.
- ADAMS, W. W. (Mapleton, New York), presented prehistoric stone implements (20248); also paint found in an Indian grave near Union Springs, New York (20456).
- ADLER, DR. CYRUS (Johns Hopkins University, Baltimore, Maryland), deposited two Babylonian seals. 19969.
- AGNEW, JOHN P. (Alexandria, Virginia), sent marl from Aquia Creek, Virginia, for examination and report. 19800.
- AIKEN, C. E. (Colorado Springs, Colorado), presented five specimens of Aiken's *Leucosticta*, *Leucosticta atrata*. 19471.
- ALBANY MUSEUM (Grahamstown, Cape Colony, South Africa), Stephen Mundy, esq., acting curator), sent shells in exchange. 19959.
- ALDRICH, CHARLES (Webster City, Hamilton County, Iowa), sent minerals for examination and report. 19725.
- ALDRICH, H. L. (Springfield, Massachusetts), presented fossil plants found in the vicinity of Cape Lisburn, Alaska. 20407.
- ALDRICH, T. H. (Blocton, Alabama), presented Eocene fossils from Claiborne Sand Bank, Alabama (19695), and seventy-five species of land shells from Mauritius and the Seychelles Islands (19855).
- ALFARO, ANASTASIO (San José, Costa Rica), presented a trap used in Costa Rica in trapping song birds (19797) and four photographs of specimens and collections in the Costa Rica National Museum (2006).
- ALLEN, Lieut. H. T. (U. S. Army), presented a quiver, two bows, and five arrows of the Cœur d'Alene Indians of Idaho Territory. 19372.

- ALLEN, J. ISHAM, and THOMAS C. ALLEN (New Haven, Connecticut), presented ethnological objects, including photographs of Yuma Indians and curios, from Arizona and Montana; a specimen of star-fish, *Heliaster*, from the Colorado Desert; and pyrites, gold in quartz, and lava rock, from California. 20493.
- ALLEN PAPER CAR WHEEL COMPANY (Chicago, Illinois) presented a paper car-wheel 42 inches in diameter. 20584.
- ALLEN, R. T. (Billings, Montana), sent a bear cub. 20679.
- ALLEN, THOMAS C. (See under J. Isham Allen, 20493.)
- AMERICAN ANGLER (New York City) presented a dried specimen of Lake Trout, *Salvelinus namaycush*. 19709.
- AMERICAN MUSEUM OF NATURAL HISTORY (New York City) lent bird-skins for comparison and study at the request of the Curator of Birds. (19611, 19773, 20363.)
- ANDERSON, W. S. (Washington, District of Columbia), presented a living specimen of Short-eared Owl. 20752.
- ANDREW, JOHN & SON (Boston, Massachusetts), presented thirty knife-proofs, also specimens of paper used for taking knife-proofs. 20621.
- ARMY MEDICAL MUSEUM (Washington, District of Columbia), through Dr. John S. Billings, U. S. Army, curator, presented composite photographs of skulls, photomicrographs, and numerous photographs representing normal and pathological histology. 20759.
- ARTHUR, Mrs. R. W. (Phoenix, Arizona), sent a plant for examination and report. 20247.
- ASBESTOS PACKING COMPANY (Boston, Massachusetts) presented specimens of asbestos. 20199.
- ATTERBURY & COMPANY (Pittsburgh, Pennsylvania), presented glassware. 20523.
- AULK, Dr. H. J. (Perryville, Arkansas), sent mineral specimen for examination and report. 19519.
- AUSTRALIAN MUSEUM (Sydney, New South Wales), through Hon. G. W. Griffin, United States consul, sent rocks, ores, and minerals in exchange. 20773.
- AVERY, S. P. (New York City), presented etchings, engravings, process prints, and mezzotints. 20799.
- AVERY, Dr. W. C. (Greensborough, Alabama), presented numerous birds' eggs and birds' nests, as follows: Nests and eggs of *Peuceea aestivalis bachmanii* (described in *The Auk*, v, No. 4, 1888, pp. 351-356), *Sitta pusilla* (new to the collection), *Geothlypis trichas*, *Piranga rubra*, *Dendroica vigorsii*, *Poliophtila carulea*, *Cardinalis cardinalis*, *Icteria virens*, and *Myiarchus crinitis* (20477, 20559, 20598, 20616, 20658, 20696). Also specimens of Bachman's Finch, *Peuceea aestivalis bachmanii* (20671, 20732).
- BABCOCK, E. C. (Helena, Montana), sent a White Goat skin (19595).
- BAIRD, Mrs. MARY H. C. (Washington, District of Columbia), presented postage-stamps, American and foreign, collected by the late Professor Baird. 20129.
- BAKER, J. U. (Stoutsville, Ohio), sent dolomite for examination and report. 19829.
- BALLOU, E. (Warrenton, Virginia), presented quartzose containing copper, also micaceous hematite. 20241.
- BALTIMORE AND OHIO RAILROAD COMPANY presented a model of the Morse telegraph instrument (20822), and also deposited models of the following objects: A two-story car; an inclosed car; a horse tread-mill locomotive; a sail car; a "Peter Cooper" passenger car; and a Morse plough used in laying telegraph wires in 1884. (20796).
- BARCLAY & COMPANY (Boston, Massachusetts) sent a model of the ship *Cumberland*. 20754.
- BARCLAY, E. D. (Washington, District of Columbia), offered for sale a specimen of Prairie Hare, *Lepus campestris*, from Wisconsin. (Purchased.) 20193.
- BARKER, GEORGE F. (Rosita, Colorado), sent ore for examination and report. 19441.

- BARKER, H. C. (See under Col. W. H. Havners, 19449.)
- BARKER, JAMES M. (Bristol, Tennessee), sent ore for examination and report. 19353.
- BARNES, W. J. (Oshkosh, Wisconsin), sent tripoli for examination and report. 20024.
- BARNUM, M. K. (Salamanca, New York), sent bird skins for examination and report. (19527, 20412.)
- BARRETT, WILLIAM H. (Lynn, Massachusetts), presented a badge of G. A. R. Post No. 5, Gettysburgh, 1887. 19377.
- BARSE, J. F. (See under New England Mining Company, 19786.)
- BARTHOLOMEW, Col. W. G. (Tampa, Florida), presented chalcedony from Hillsborough Bay, Florida. 20632.
- BARTLETT, EDWARD (Maidstone, Kent, England), presented ethnological objects from Madagascar; birds, from Asia and Australia chiefly; birds' eggs and nests, also two reptile eggs, from Madagascar; a collection of Coleoptera from Madagascar, constituting the first representation of the insects of this region in the National Museum; four tortoise shells and land shells from Madagascar. 20093.
- BARTLETT, J. R. (Mount Pleasant, District of Columbia), presented a Mole, *Scalops aquaticus*. 19371.
- BASTOW, T. W. (Guadalajara, Mexico), presented land and fresh-water shells from Mexico. 19785.
- BATCHELOR, WARD (El Paso, Texas), presented stone idols from Mexico and old French, Spanish, and Latin books. 19376.
- BATES, C. P. (Berkeley, California), sent insect for name. 20790.
- BATTEY, CHARLES (Buffalo, New York), sent a plant for examination and report. 19494.
- BAXTER, R. L. (Keesville, New York), presented two specimens of norite. 20485.
- BAYARD, Hon. THOMAS F., Secretary of State, lent two Babylonian seals for casting. 20315.
- BAYER, W. H. von (Washington, District of Columbia), presented a Garter Snake, *Eutania sirtalis* (19620) and a living specimen of Hog-nose Snake, *Heterodon platyrhinus* (20674).
- BAYLESS, W. C. (Mossy Creek, Jefferson County, Tennessee), presented Silurian fossils from Granger County, Tennessee. 20352.
- BEACH, H. (Prairie-du-Chien, Wisconsin), presented prehistoric stone implements from the banks of the Mississippi River in Wisconsin. 20171.
- BEACHLER, CHARLES S. (Crawfordsville, Indiana), sent Lower Carboniferous fossils from Burlington, Iowa, and Crawfordsville, also reptiles from Montgomery County; in exchange. (20255, 20692.)
- BEACOM, Lieut. J. H., U. S. Army (Fort Shaw, Montana), presented a specimen of Lake Trout, *Salvelinus namaycush*; also photograph of specimen of the same species. 20072.
- BEAN, Dr. T. H. (Fish Commission United States), presented a collection of birds; marine and fresh-water fishes; a Mink; and a living specimen of Green Turtle, from Somers Point, New Jersey; also a Black-poll Warbler, *Dendroica striata*. (19453, 19659, 20750.)
- (See also under Fish Commission, United States, 19659.)
- BEATH, JAMES W. (Philadelphia, Pennsylvania), sent a collection of cut stones and gems. 20818.
- BEATTY, J. C. (El Paso, Texas), sent ore for examination and report. 20502.
- BECK, W. H. (through Dr. D. T. Day, U. S. Geological Survey), presented earthy deseloizite from Montana. 20139.
- BECKHAM, C. W. (Bardstown, Kentucky), presented two hundred and nineteen specimens of bird skins from Texas (19997); and sent bird skins for examination and report (19440).
- BECKWITH, CYRUS W. (New London, Connecticut), presented a badge of the "Putnam Phalanx," Washington, 1887. 19690.

- BECKWITH, GEORGE H. (Charlestown, West Virginia), sent chert nodules containing seams, for examination and report. 20709.
- BECKWITH, PAUL H. (U. S. National Museum), presented electrotypes of ancient and modern coins (20070), postage-stamps from various localities and old coins of the United States (20332), deposited various military medals and decorations (20379, 20461), and gave postage-stamps and military decorations in exchange. (19716, 20304.)
- BEECHER, C. E. (Albany, New York), presented a fossil, *Acidaspis hamata* Conrad, from the Lower Helderburg formation (Upper Silurian), Clarksville, New York. 19823.
- BEERS, ANTHONY (Oxmoor, Alabama), sent insect for name. 19560.
- BELL, CAREY (Utica, Ohio), presented prehistoric stone implements, twenty-five specimens. 20413.
- BELL, JAMES (Gainesville, Florida), presented a Diamond Rattlesnake, *Crotalus adamanteus*. 20102.
- BELL, WILLIAM (Philadelphia, Pennsylvania), presented a daguerreotype gilding stand. 21770.
- BEMENT, C. S. (Philadelphia, Pennsylvania), presented garnet from Pennsylvania, cassiterite from England, pyrite crystals from Italy, and a large microlite crystal from Virginia. 20066.
- BENEDICT, Dr. A. L. (Buffalo, New York), presented prehistoric stone implements, thirty specimens, from Buffalo, New York, and Fort Erie, Canada. 20365.
- BENÉT, Brig.-Gen. S. V., U. S. Army. (See under War Department, 20209.)
- BENNETT, G. B. (Philadelphia, Pennsylvania), presented two bird skins, *Agilis semipalmata*, from Corpus Christi, Texas. 19732.
- BENNETT, L. J. (Buffalo, New York), presented fossil crustaceans, including ten genera, ten species, from the water-lime formation (Upper Silurian) near Buffalo, New York. A very important accession, containing many beautiful specimens. 19949.
- BENSAL, Capt. R. A. (Newport, Oregon), presented chalcedony pebbles, containing a liquid, from Oregon. (Through Hon. Binger Hermann, M. C.) 26004.
- BENSON, Lieut. H. C., U. S. Army (Fort Huachuca, Arizona), presented bird skins, a valuable and interesting collection, containing a fine adult specimen of *Trogon ambiguus*, a series of *Corvus cryptoleucus* and *Falco fusco-caerulescens* (19363); nests of *Psaltiriparus plumbeus*, *Campylorhynchus brunneicapillus*, and one unidentified (19363); eggs of *Buteo swainsoni*, *Callipepla squamata*, *Columba fasciata*, and eggs with nest of *Vireo huttoni stephensi* (19352, 19488) (see Proceedings U. S. Nat. Museum, 1887, pp. 551, 556, 557); also reptiles from Arizona, including *Crotalus adamanteus*, *Pityophis*, and *Crotaphytus* (19452).
- BERGEN MUSEUM (Bergen, Norway) sent seventy-five specimens of bird skins in exchange. 20468.
- BERGER, WILLIAM H. (U. S. National Museum), presented copper cents of the United States, dated 1798, 1805, and 1807. 20218.
- BERRY, Hon. JAMES H. (United States Senate), sent ore for examination and report. 19419.
- BESSAC, F. T. (Natchez, Mississippi), presented paper money of the Confederate States 20226.
- BESSELS, Dr. EMIL (Washington, District of Columbia), deposited plants from Spitzbergen, a valuable collection, containing authentic specimens from eminent authorities, most of them being new to the collection. 20121.
- BETTY, Dr. E. G. (Cincinnati, Ohio), presented a silver twenty-five cent piece of the United States, dated 1802. 19689.
- BEVERLY, J. B. (The Plains, Virginia), sent skeleton of American Crossbill, *Loxia curvirostra americana*, for examination and report. 20190.
- BIDWELL, Mrs. C. A. (Clip, Yuma County, Arizona), sent minerals for examination and report. 20489.

- BIERSTADT, ALBERT (New York City), presented a finished proof of an engraving by James Smillie, after Bierstadt, "The Rocky Mountains." 20356.
- BIGELOW, Miss, presented a coin of Napoleon, 1854, five centimes. (Through John Bigelow.) 20062.
- BIGELOW, JOHN. (See under Miss Bigelow, 20062.)
- BILLINGS, Dr. JOHN S., U. S. Army. (See under Army Medical Museum, 20759.)
- BLACK, Dr. E. C. (Wheatland, Indiana), presented prehistoric stone implements from Knox County, Indiana. 20178.
- BLACKFORD, EUGENE G. (New York City), presented specimens of fish, among them *Trachynotus goreensis* (19666), *Lutjanus blackfordi* (19733), *Salmo salar* (19766) and *Sebastes marinus*, containing a rare species of Lernæan parasite (20449); also a pair of American Bisons, living specimens, from Nebraska (20586).
(See also under Don Ramon Paez, 20388.)
- BLOW, Lieut. WILLIAM N., U. S. Army (Fort Randall, Dakota), sent chippings from a "cigar stone," together with detailed description and drawings of the stone *in situ*. 20424.
- BLUE, L. (Department of the Interior), presented a model of a hand corn-sheller, 19634.
- BOARDMAN, GEORGE A. (Calais, Maine), sent skin of hawk, *Falco columbarius*; also portion of the trachea of *Glaucionetta clangula americana* and of *G. islandica*, for examination and report. 19995.
- BOAZ, Dr. FRANZ (New York City), sent ethnological objects from British Columbia in exchange (19597); also sent others for examination with a view to exchange (19425).
- BOBBETT, ALBERT (Brooklyn, New York), presented color-prints from blocks engraved by the donor. 20641.
- BODEKER, J. K. (Newberry, Pennsylvania), presented pierced ceremonial object from Clinton County, Pennsylvania. 20551.
- BOEHMER, GEORGE H. (Smithsonian Institution), presented foreign official seals (six hundred and twelve wax impressions), Turkish newspaper stamp, and Russian postage-stamp (19777), and deposited a silver medal of the Prussian life-saving service (19779).
- BOGGS, J. O. (Washington, District of Columbia), presented a living specimen of Opossum. 20054.
- BOLLES, Lieut. T. DIX, U. S. Navy, presented Eocene marl with *Ostræa sellæformis* and *Turritella mortoni*; also Jumping Mice, *Zapus hudsonius*, from Prince George County, Maryland (19700); specimens of ivory carving from Canton, and writing case and materials from Japan (19793), and deposited old Japanese bronze ash-receiver (20143), and Japanese swords (19429).
- BOLLMAN, C. H. (Bloomington, Indiana), presented fourteen new species of American Myriapods. 20145. (Described in Proceedings of U. S. National Museum, vol. x, 1887, pp. 617-627.)
(See also under Prof. D. S. Jordan, 20145.)
- BOLTON, H. CARRINGTON (New York City), presented a photograph of Rev. Joseph Priestley, D. D. (19981), and specimens of rock salt from Petit Anse, Louisiana (20043), and deposited a cane presented to Rev. Dr. Priestley by Thomas Jefferson (19982); also a lithograph of the steam-ship *Savannah*, the first to cross the Atlantic (20831).
- BOND, S. H. (U. S. National Museum), presented a copper coin from Italy. 19604.
- BOND, W. R. (Custer City, Dakota), sent limestone for examination and report. 20033.
- BONNETT, Hon. PETER. (See under Treasury Department, U. S. Revenue Marine, 19774.)
- BORDINE, J. H. (Green Dale, Virginia), sent hematite, conglomerate of quartz pebbles, limonite, and sandstone, for examination and report. 19746.
- BOSTON BOX-WOOD COMPANY presented a rough section of box-wood. 20588.

- BOSTON SOCIETY OF NATURAL HISTORY on several occasions lent bird skins for comparison and study at the request of the Curator of Birds. (19361, 19451, 19584, 19599, 19662.)
- BOSWELL, R. H. (Washington, District of Columbia), presented a living specimen of Red-tailed Hawk, *Buteo borealis*. 20127.
- BOSWORTH, G. L. (Holyoke, Massachusetts), presented a photograph of fossil foot-prints. 19842.
- BOULDING, GEORGE (Washington, District of Columbia), presented a living Raccoon. 20212.
- BOURKE, Capt. JOHN G., U. S. Army. (See under U. S. Military Academy, 19685.)
- BOWEN, AMASA (keeper of life-saving station, Atlantic City, New Jersey), presented a Pygmy Whale, *Kogia breviceps*, male, in the flesh. 20473.
- BOWERS, T. B. (Winfield, Tuscarawas County, Ohio), presented a flint knife with handle, wrought of one piece. 19631.
- BOYLE, C. B. (U. S. Geological Survey), presented agate from the vicinity of Laredo, Texas. 20138.
- BRENNINGER, G. F. (Fort Collins, Colorado), sent bird skins for examination and report. 19447.
- BREWSTER, Miss (Washington, District of Columbia), presented a Gray Parrot, in the flesh. 20334.
- BREWSTER, WILLIAM (Cambridge, Massachusetts), presented bird skins from northern Mexico (19944) and ninety-four specimens, including twenty-three species, from Lower California (20039), and kindly lent specimens for comparison and study at the request of the Curator of Birds (19417, 19909, 20788).
- BRICKELL, Miss A. A. (Miami, Dade County, Florida), sent a radiate, *Astrophyton costosum* Seba, for examination and report. 20374.
- BRIDGMAN, A., jr. (Keokuk, Iowa), presented skin of a swan from Lime Lake, Adams County, Illinois. (Through M. Meigs.) 20663.
- BRILL, J. G., & Co. (Philadelphia, Pennsylvania), presented photographs of interior and exterior of a tram-way sleeping-car built for the "Tramway Rural," Buenos Ayres. 20472.
- BRISTOL, W. H. (See under Stevens Institute of Technology, 20797.)
- BRITISH MUSEUM (London, England), sent meteoric iron in exchange. 19915.
- BROOKS LOCOMOTIVE WORKS (Dunkirk, N. Y.), through M. L. Hinman, vice president and treasurer, presented photographs and cyanotypes of locomotive with "Coventry" boiler. 20508.
- BROOKS, P. H. (Montevideo, Uruguay), presented photographs of seal rookery, Falkland Island; also photographs of Sea-gulls and Penguins. 19547.
- BROWN, ARTHUR E. (See under Zoological Society of Philadelphia.)
- BROWN, C. G. (Stockton, Utah), sent ore for examination and report. 19939.
- BROWN, GEORGE E. (Alexandria, Virginia), presented a living specimen of Gray Fox, *Urocyon virginianus virginianus*. 20060.
- BROWN, HERBERT (Tucson, Arizona), presented nests of *Campylorhynchus brunneicapillus*, *Harporhynchus bendirei*, *H. palmeri*, and *Amphispiza bilineata* (20541, 20683); eggs of *Pipilo fuscus mesoleucus*, *Pyrranga rubra cooperi*, *Lanius ludovicianus excubitorides*, *Empidonax pusillus*, *Poliophtila plumbea*, and *Dendroica aestiva* (20478), and a specimen of Variegated Gecko, *Coleonyx variegatus* (20478); also sent birds' eggs for examination (20635, 20708).
- BROWN, JOHN E. (U. S. Fish Commission), presented a penny of Jamaica, 1880 (19654), and a living specimen of Screech Owl (19875).
- BROWN, J. T. (Gravella, Alabama), sent insect for name. 19520.
- BROWN, J. W. (Confluence, Pennsylvania), presented skull of a cow. 20714.
- BROWN, Mrs. M. E. (New York City), sent in exchange Arabian lute, Egyptian oud, New Guinea drum, Cuban rattle, African cymbals, Indian head drum, Turkish bag-pipe, Syrian flute, Turkish drum, and an Apache flute made by an Indian boy at Carlisle, Pennsylvania. (19847, 20030, 20230.)

- BROWN, S. G. (Smithsonian Institution), presented reptile eggs. 20731.
- BROWN, W. Q. (through U. S. Geological Survey), presented olivine rock, and minerals, mostly genthite. 20303.
- BRYANT, WALTER E. (San Francisco, California,) lent bird skins for comparison and study, at the request of the Curator of Birds. 19927.
- BUMPUS, L. I. (Anuburn, Maine), sent minerals in exchange. 19463.
- BUNTING, W. S. (Jacksonville, Florida), presented a Striped Mullet, *Mugil albula*, of peculiar coloration. 19661.
- BURCHART, S., & Co. (Batesville, Mississippi), sent infusorial earth for examination and report. 19385.
- BUREAU OF ETHNOLOGY, Maj. J. W. Powell, director, transmitted archaeological specimens collected during the fiscal year ending June 30, 1887 (20249); photograph of Web-wah the Zuni priestess setting up "prayer plumes" (19373); and arrowheads and shell beads from California (19465).
- BURGER, PETER (U. S. National Museum), presented an antique caster with cruet. 20727.
- BURNET, WILLIAM (Cincinnati, Ohio), deposited a pair of silver-mounted flint-lock pistols, once the property of Lafayette. (Returned.) 19642.
- BURNS, FRANK (U. S. Geological Survey), presented window-glass sand from Marlborough, New Jersey (19832); twenty-eight specimens of chalcedony, from near Tampa, Florida (20631); Post-Pliocene sandstone and silicified Miocene coral, from near Tampa Bay, Florida (20651); and a crab, *Libinia dubia*, caught in Tampa Bay by James Newman (20690).
- (See also under United States Geological Survey 19554, 19555, 19849.)
- BURNS, W. C. (Austin, Texas), presented a living specimen of Collared Lizard, *Crotaphytus collaris*. 20780.
- BURNS, W. R. (Concord, Lewis County, Kentucky), presented prehistoric stone implements (19627, 19834, 20027), and casts of fossils, *Conocardium* and *Bellerophon Michisonia* (19627); also sent skull of a horse for examination and report (19627).
- BUSH, Mrs. A. E. (San José, California), presented a specimen of liquorice root. (Through A. A. Crozier, Department of Agriculture.) 19368.
- BUTLER, AMOS W. (Brookville, Indiana), presented bird skins, *Ammodramus sandwichiensis brunneus* Butler (new subspecies) and *Elainea fallax*, new to the collection (20618); also sent bird skins for examination (20151, 20438).
- BUTLER, E. J. (Eureka, Nevada), sent rock for examination and report. 20012.
- BUTLER, F. H. (London, England), sent minerals. (19885, 20817.)
- BUTLER, Hon. R. R. (House of Representatives), sent ore for examination and report. 20390.
- BYINGTON, A. H. (See under George F. Daniels, 20546.)
- BYRNE, Dr., U. S. Army (through U. S. Geological Survey), presented five specimens of alunogen from Utah. 20069.
- CALDWELL, HENRY (Washington, District of Columbia), presented a model of an ancient Chinese temple. 19754.
- CALIFORNIA ACADEMY OF SCIENCES (San Francisco, California) lent twenty-four photographs of Easter Island. 19531.
- CALIFORNIA STATE MINING BUREAU (San Francisco, California) presented five specimens of coemanite (19497), and sent cast of an iron meteorite from Alaska in exchange (20321).
- CALIFORNIA STATE MINING SCHOOL (San Francisco, California) presented three specimens of linarite from Cerro Gordo, California. 20203.
- CALL, R. ELLSWORTH (Des Moines, Iowa), presented a shell, *Succinea obliqua* Say, with parasite attached (19351); a collection of fishes and reptiles from the vicinity of Des Moines (19517); fresh-water shells, a fine specimen of crinoid column, from the Carboniferous deposits of Boone County, Missouri, and crustaceans and worms from Missouri (19710).

- CAMBRIDGE UNIVERSITY, Museum of (Cambridge, England), through J. W. Clark, superintendent, sent in exchange bones of extinct tortoises and of didine birds from Mascarene Islands. 19673.
- CAREY, MRS. MATTIE WARD (Lyells, Richmond County, Virginia), sent marl for examination and report. 19522.
- CARLIN, General WILLIAM P., U. S. Army, sent ore for examination and report. 19966.
- CARLISLE, N. F. (Round Hill, Virginia), sent epidote and quartz, quartz and decomposed pyrite, and chalcopyrite in quartzose rock, for examination and report. 20744.
- CARPENTER, Dr. P. HERBERT (Eton College, Windsor, England), presented crinoids from the dredgings of H. M. S. *Porcupine* during the year 1870, among these *Pentacrinus wyvillethomsoni* from the eastern Atlantic, and *Antedon phalangium* from the coast of Tunis. 20483.
- CARPENTER, Lient. W. L., U. S. Army, presented a Gila Monster, *Heloderma suspectum* (19670); two arrowheads from Arizona (19759); prehistoric stone implements; reptiles, including *Sceloporus*, *Cnemidophorus*, *Eutania*, and *Eumeces obsoletus*; eggs of *Mimus polyglottus* and of *Passerina amoena*; White-footed Field Mouse, *Hesperomys leucopus*, Cañon Wren, *Catherpes mexicanus conspersus*, and Black-nosed Dace, *Rhinichthys transmontanus* (19808).
- CARR, JAMES (Newark, New Jersey), presented a badge of Lincoln Post, No. 11, G. A. R., annual excursion. 19734.
- CARR, Prof. WILLIAM B. (Leesburgh, Virginia) presented a bamboo fish-hook box from Sandwich Islands (19607), and rutile crystals and micaceous hematite (20065).
- CASE, R. W. (Alba, Umatilla County, Oregon), sent a sample of ore for examination and report. 20712.
- CASTLE, Dr. FREDERICK A. (New York City), presented a collection of proofs made by himself from wood blocks in his possession, engraved by Dr. Alexander Anderson. 20801.
- CENTRAL PARK MENAGERIE (New York City), through W. A. Conklin, superintendent, presented three living specimens of Gray Monitor Lizard (19476), also two young tigers in the flesh (20010).
- CENTURY COMPANY (New York City), through William Lewis Fraser, manager, presented drawings, proofs, and engraved blocks and plates. (20108, 20196.)
- CHADBOURNE, A. P. (Cambridge, Massachusetts), lent bird skins for comparison and study at the request of the Curator of Birds 20035.
- CHALMERS, PATRICK (London, England), presented a photograph of James Chalmers, of Dundee, and a fac-simile of adhesive postage-stamp devised by Mr. Chalmers in 1838; also volume relating to the origin of the adhesive stamp. 20205.
- CHAMBERLAIN, C. W. (Boston, Massachusetts), sent bird skins, including *Otocoris alpestris* and *Passerculus princeps*, in exchange. 20146.
- CHAMPAGNE, W. W. (Washington, District of Columbia), presented copper coins; also mint tokens, "U. S. No. 6" and "Tontine," and ten-reis piece of Brazil, 1817. 20536.
- CHASE, G. N. (Lynn, Massachusetts), presented a badge of G. A. R., Gettysburgh, 1887. 19378.
- CHASE, MRS. M. J. (See under Dr. Isaac Lea, 20423, 20525.)
- CHATARD, Dr. T. M. (U. S. Geological Survey), presented soda crystallizations from vat at Owen's Lake, California. 19755.
- CHATELLIER, PAUL DU (Finistère, France), presented silver coins of Conan III., Duke of Brittany, of Count of Guingamp, and of Viscount Foulques of Anjou. 19495.
- CHATFIELD, SILAS (Kingston, New Mexico), sent ore for examination and report. 19418.
- CHENEY, Mrs. EDNA D. (Jamaica Plains, Massachusetts), presented engravings by the donor and others. 20272.

- CHERRIE, GEORGE K. (Cedar Rapids, Iowa), presented bird skins from Iowa, Dakota, and New York. 20314.
- CHICAGO, BURLINGTON AND QUINCY RAILROAD (Through G. W. Rhodes) presented standard splices, bolts, locks, and nuts. 20310.
- CHILDS, F. D. (See under Hinkley Locomotive Works, 20408.)
- CHUBB, THOMAS H. (Post Mill Village, Orange County, Vermont), presented a Horse-hair Snake, *Gordius* sp. (19844), and sent fish for examination and report. 19437.
- CHURCH, F. S. (New York City), presented drawings, sketches, and etchings (20277), and Japanese proof etching, "A Pathetic Story" (20623).
- CHURCH, JOSEPH & CO. (Tiverton, Rhode Island), presented a "natural formation" from Long Island (19836); clams, *Mya arenaria*, from Portsmouth, Rhode Island; and a fish, *Epinephelus niveatus* (19854).
- CILLEY, TRISTRAM (Norwich, Connecticut), sent diatomaceous earth in exchange. 19827.
- CLARK, A. HOWARD (U. S. National Museum), presented a medal of white metal with heads of Lincoln and Garfield. 19608.
- CLARK, DR. EUGENE (Lockhart, Texas), presented medal of International Medical Congress, held in Washington, September, 1887. 19569.
- CLARK, G. H. (Selma, Alabama), sent ore for examination and report. 20492.
- CLARK, JOHN N. (Saybrook, Connecticut), sent birds' eggs and birds' nests in exchange. 19382.
- CLARK, J. W. (See under Cambridge University, Museum of, 19673.)
- CLARKE, Prof. F. W. (U. S. Geological Survey), sent two Corean postage-stamps in exchange. 20142.
- CLARKE, THOMAS B. (See under Augustus St. Gaudens, 20084.)
- CLEVELAND, HON. GROVER presented a living specimen of Golden Eagle from Tennessee. 20050.
- CLEVELAND, VANNOY (Greenville, South Carolina), presented a French musket, flint, and steel, captured from the British forces by Jesse Vannoy, at the battle of King's Mountain, 1780. 19953.
- CLITHERALL, GEORGE BURGWIN (Mobile, Alabama), presented a sword (Toledo blade) presented to Dr. G. C. Clitherall, U. S. Army, in war of 1812; also, original and copy of a note from Hon. Joel R. Poinsett to Dr. Clitherall. 20031.
- CLOSSON, WILLIAM B. (Boston, Massachusetts), presented wood-engraving proofs by the donor. 20827.
- COALE, H. K. (Chicago, Illinois), presented bird skins from South America and from India. 19393.
- COCKRAN, A. W. (Washington, District of Columbia), deposited a living specimen of Brazilian Macaw. 20111.
- COCKCROFT, J. M. (Croton Landing, Hudson River, New York), sent plant for name. 19521.
- COCKERELL, THEODORE D. A. (West Cliff, Colorado), presented insects, miscellaneous lots (19694, 20075); a collection of shells, including *Helix cooperi* Say, two Caddis worm cases, *Limnaea*, *Pupilla*, *Vertigo*, and *Spharium*; White-footed Mouse, *Hesperomys leucopus*; Yellowstone Trout, *Salmo* sp., too young for specific identification, and moss, *Hypnum* sp. (19697), Ornate Lizard, *Uta ornata*; and Six-lined Lizard *Cnemidophorus sexlineatus*, from Plateau Creek, Colorado (20075; and sent a large collection of insects (19861), and a stone containing the cast of a shell, *Succinea pfeifferi* Rosem, var. *virescens* Cockerell, for examination and report (20075).
- COE, DR. HENRY W. (Mandan, Dakota), presented prehistoric stone implement. 20253.
- COFFIN, HON. C. E. (Muirkirk, Maryland), presented South Carolina phosphate, crystallized iron ore, and slag. 20002.
- COFFY, JOHN (Cheney, Kansas), sent fossil canal of *Charitetes* sp., for examination and report. 20392.

- COLBURN, Dr. G. F. I. (Washington, District of Columbia), presented a pocket-knife and an old spear-head, found on the battle-field of Ticonderoga. 19846.
- COLHOUER, E. H. (Perryville, Arkansas), sent ore for examination and report. 19561.
- COLLETT, Prof. JOHN (Indianapolis, Indiana), presented two specimens of Upper Devonian fossils, *Zaphrentis colletti*, from Crab Orchard, Kentucky. 19983.
- COLLETT, R. H. (Staunton, Virginia), presented a specimen of galena. 20250.
- COLLINS, Capt. J. W. (See under Fish Commission, United States, 19588.)
- COLORADO SMELTING COMPANY (Pueblo, Colorado) presented coke and slag. 20021.
- COLSON, JAMES M. (Petersburgh, Virginia), sent minerals for examination and report. 19721.
- COLTON, O. B. (Fort Worth, Texas), sent insects for examination and report. 20447.
- COLT'S PATENT FIRE-ARMS MANUFACTURING COMPANY (Hartford, Connecticut) deposited a lightning rifle of heavy caliber. 20814.
- COMBS, J. (Caperton, West Virginia), sent rock for examination and report. 19541, 20013.
- CONANT, AMBROSE (Big Run, Ohio), sent ore for examination and report. 19391.
- CONKLIN, W. A. (See under Central Park Menagerie.) 19476.
- CONRAD, L. (Stoutsville, Ohio), sent quartz, metallic iron, sandstone, mica, and schist (19906); and black mica, quartz, and an ore of iron (19960), for examination and report.
- COONEY, M. (Cooney, New Mexico), presented fiber, together with some woven substance, from an Aztec ruin at Pleasauton, Socorro County. 20144.
- COOPER, W. B. (U. S. National Museum), presented model of float for "night" or "witch lamp," also model of antique candle extinguisher. 20771.
- COOPER, W. F. (Bristol, Tennessee), sent clay colored by bituminous matter for examination and report. 19760.
- COQUILLET, D. W. (Los Angeles, California), presented a collection of Diptera, consisting mostly of Bombyliidae from California, or adjacent localities, and very largely typical of species described by Mr. Coquillett. 20336.
- CORRINE, LEVERETT (New Hurley, New York), sent clay, for examination and report. 20675.
- CORY, CHARLES B. (Boston, Massachusetts), presented reptiles from Old Providence Island, West Indies (19362), and Mocking-bird, *Mimus magnirostris*, from St. Andrew's Island (19674); lent bird skins for comparison and study at the request of the Curator of Birds (19926); and sent bird skins for examination and report (19360, 19838, 19839).
- COTMAN, H. J. (Cedar Glades, Arkansas), sent ores for examination and report. 19398.
- CUMBE, EPPA HUNTON (Washington, District of Columbia), presented a living Opposum. 20201.
- CRAWFORD, Prof. A. (Theological Seminary, Fairfax County, Virginia), deposited a cast of "The Egg of Sargon." 20826.
- CRAWFORD, MARION (Kahoka, Missouri), presented prehistoric stone implements, twenty-seven specimens, from Clark and Lewis counties, Missouri; ten of these are paleolithic. 20252.
- CREEL, H. M. (Devil's Lake, Dakota), presented ethnological objects: shield, war bonnet, quiver, bow and twenty arrows, knife, tomahawk, pair of saddle-bags, black stone pipe and stem, beaded pouch of the Chippewas, swan-wing fan and deer-call (colored), red stone tomahawk-pipe and stem, tobacco-bag, gun-cover, crooked lance, feather ornament, Sharp's carbine, knife-scabbard, papoose bonnet, Chippewa tobacco-bag, awl-case, straw-dance sash, Chippewa pouch, pair of moccasins, ornament (containing umbilical cord), Cheyenne target, arrows, breast-ornament, cane made of willow-root, red stone pipe, red stone horse-pipe and stem, Chippewa pouch, lacrosse stick, and squaw breast-ornament. 20615.

- CROSBY, W. O. (Boston, Massachusetts), presented chalcedony from Tampa Bay, Florida; Carboniferous sandstone from Tiverton, Rhode Island; and pyrite concretions from Newfoundland (19528); and sent phonolite from Black Hills, Dakota, in exchange (19750).
- CROSS, WHITMAN. (See under Interior, Department of the, U. S. Geological Survey, 20156.)
- CROWWHITE, A. H. (Denver, Colorado), sent ore for examination and report. 19667.
- CROZIER, A. A. (See under Mrs. A. E. Bush, 19368.)
- CUMMINGS, W. F. (Dallas, Texas), presented fossil coal, and Carboniferous fossils. (Through Prof. R. T. Hill.) 19558.
- CUNNINGHAM, C. W. (through U. S. Geological Survey), presented antlerite and barite from Arizona. 20339.
- CUNNINGHAM, Howard C. (Fort Klamath, Oregon), sent insect, for name. 19895.
- CURRIE, J. M. (Washington, District of Columbia), presented a silver coin of Brazil, Peter II., 1867. 19794.
- CURTIS, PATRICK (Grangerville, Idaho), sent ores for examination and report. 19438.
- CUTLER'S ART STORE (New Haven, Connecticut). (See under Prof. C. U. Shepard, 20026.)
- DALL, W. H. (U. S. Geological Survey), presented a chromo-lithograph illustrating the origin of the Stars and Stripes (20646); also two hundred and fifty specimens of mollusks (20723.)
(See also under Interior, Department of the, U. S. Geological Survey, 20733.)
- DANIELS, GEORGE F. (Oxford, Massachusetts), sent stone implements for examination and report. 20546.
- DAVENPORT ACADEMY OF NATURAL SCIENCES (Davenport, Ohio) presented prehistoric stone implements: Five paleolithic implements, six scrapers, two rude arrowheads, a rude, notched implement, and a leaf-shaped implement, from Iowa; three rude spear-heads, four scrapers, and two rude arrowheads, from Illinois; a rude implement and a leaf-shaped implement, from southern Wisconsin; a small cutting implement, from Utah; a small arrowhead, from Dakota; two small chipped celts and two arrowheads, from Georgia; eight small, rude paleolithic implements, from Alabama; six small, rude implements, a leaf-shaped implement, two small cutting or scraping implements, a trimmed flake, a leaf-shaped cutting implement, and a cutting tool with stem, from Arkansas. Fifty-two specimens. 20751.
- DAVIDSON, W. M. (McElmo, Utah), sent pottery, three vessels dug from cliff-houses situated on the south slope of the Sierra Abajo, in exchange. 20725.
- DAVIS, Miss DEBORAH D. (Lynchburgh, Virginia), presented a Methodist hymn book. 19772.
- DAVIS, ERWIN. (See under Augustus St. Gaudens, 20084.)
- DAVIS, HOWARD B. (Reading, Pennsylvania), presented prehistoric stone implements, twenty-two specimens. 20210.
- DAVIS, H. J. (Davis, Massachusetts), presented a specimen of chalcopyrite. 19380.
- DAVIS, O. V. (Mandan, Dakota), presented a living specimen of Red Fox. 19869.
- DAY, Mrs. C. C. (Washington, District of Columbia), deposited commissions to David Cathcart, one signed by President Andrew Jackson, the other by President Van Buren; also a proclamation by President Jackson, December 10, 1832: "Our Union must be preserved." 20090.
- DAY, Dr. D. T. (U. S. Geological Survey), presented rutile from Chester County, Pennsylvania (19902); also glassware (20524).
(See also under W. H. Beck, 20139.)
- DE LA MATER, L. M. (Flushing, South Carolina), presented fossil cetacean vertebrae, from the phosphate beds of South Carolina. 29370.
- DELANEY, PATRICK (Gloucester, Massachusetts), presented a specimen of fish, *Chimera affinis*. 19901.

- DELAWARE AND HUDSON CANAL COMPANY (through H. G. Young, assistant president and general manager) presented a model of the locomotive "Stourbridge Lion," first locomotive constructed in the United States (19904); also walking-beam, four driving-wheel tires and three track-centers belonging to the original locomotive "Stourbridge Lion" (20761).
- DEMONET, Mme., & SON (Washington, District of Columbia), presented a cat, *Felis domesticus*, in the flesh. 19365.
- DENHAM, CHARLES S. (East Pepperell, Massachusetts), sent eggs of a neuropterous insect, probably those of an Ephemerid or "May fly," for examination and report. 19513.
- DENHAM, JENNIE L. (Richfield, Kansas), sent glass or slag for examination and report. 19728.
- DENTON, S. W. (Wellesley, Massachusetts), sent bird skins. 20786.
- DERBY, ORVILLE A. (See under National Museum, Rio de Janeiro, 20192.)
- DEVENGER, GEORGE W. (Brooklyn, New York), presented larva of *Callidium antennatum*, found in a piece of kindling-wood. 20562.
- DEVEREAUX, J. (Raleigh, North Carolina), sent plant for name. 19687.
- DE VINNE, THEODORE L. (New York City), presented impressions from a wood-cut illustrating overlaying; together with printed explanations. 20264.
- DILLER, J. S. (U. S. Geological Survey), presented fluorite and calcite on limestone, from Greason, Cumberland County, Pennsylvania (20206); also fulgerite on hypersthene basalt, from Oregon; and fulgerite on andesite, from Little Ararat, in Armenia (20367).
(See also under John Miller, 20366.)
- DITHRIDGE FLINT GLASS COMPANY (New Brighton, Pennsylvania) presented four wine-glasses, three glass globlets, and a cut-glass pickle-dish. 20686.
- DIX, Miss D. L. (deceased). (Through Dr. W. W. Godding, Superintendent of the Government Hospital for the Insane.) Bequest of a small collection of geological specimens; also arrow-heads from Oregon; fossil shells and deposits from an artesian well. 19890.
- DOAN, C. F. (Doan's, Texas), sent mascasite for examination and report. 20005.
- DOANE, W. H. (Cincinnati, Ohio), sent idols, supposed to be of Aztec origin. 20647.
- DODGE, WALLACE H. (Mishawaka, Indiana), presented a pierced ceremonial object. 19706.
- DONALDSON, THOMAS (Philadelphia, Pennsylvania), presented invitation card to President Lincoln's inauguration ball, 1865; various United States Mint tokens; also Canada "Wellington" token (19467); plates from "American Art Review" (20265); and Pennsylvania Bi-Centennial medal, 1882; and a campaign badge of Cleveland and Hendricks (20320).
- DOUGAL, W. H. (Washington, District of Columbia), presented eight engravings by the donor. 20627.
- DOUGLAS, A. B. (Eustis, Maine), sent the skin of a male Moose. 20015.
- DRAKE, Mrs. JAMES H., presented a larva of *Empretia stimulea*; found near Warren-ton, Virginia. 19529.
- DRAKE, Dr. J. N. (Smithville, Tennessee), presented a collection of articles from a mound near Smithville. 19606.
- DRESSER, H. E. (London, England), sent in exchange bird skins, twenty-one specimens, nineteen species, chiefly from Europe. 19971.
- DREW, S. H. (Wanganui, New Zealand), sent fossils from the Wanganui beds (Pliocene) in exchange. 19580.
- DUDLEY, S. S. (See under J. T. Johnson, 20557.)

DUGÈS, Prof. A. (Guanajuato, Mexico), contributed the following collections—

BIRDS: *Carpodacus mexicanus*, *Euethia pusilla*, *Volatinia splendens*, *Calamospiza melanocorys*, *Icterus bullocki*, *Dendroornis eburneiostris*, *Zenaidura macroura*, *Falco columbarius*, *Buteo borealis calurus*, *Strix pratincola*, *Magascops asio trichopsis*, *Gallinago delicata*, *Ereunetes occidentalis*, and *Larus delawarensis*.

INSECTS: Lepidoptera—*Anemeca ehrenbergii*; Diptera—*Lucilia cesar* L., *Lucilia* sp.?, *Tabanus lineata*, *Tabanus* sp.? (near *trispetus* Will.), *Scoliopelta* (allied to *luteipes* Will.), *Odontomyia binota* Lw., *Microstylus* sp.?, *Conops* sp.?, *Psilopus* (allied to *sipho* Say), *Dolichopus* sp.?, *Belvoisia bifasciata* Fabr.; Hemiptera—*Serphus dilatatus* Say (a species very close to our *Corixa harrisii* Uhler), *Piratus biguttatus* Say, *Pacilocapsus lunatus* L.; Homoptera—*Cicada* (near *auletes* Germ.), two *Cicadas* (species unknown), *Proconia* sp.?, Orthoptera—*Anisolabia maritima* Bon., *Spongophira* sp.?, Hymenoptera—*Anthophora marginata* Sm., *Agapostemon* sp.? (near *atricornis*), *Pheidole* sp.?, *Camponotus vicinus* Mayr. (variety of), *Pheidole* (near *bergi* Mayr.), *Liometopum* sp.?, *Polistes* sp.?, *Lissonota*?, *Scleroderma* sp.? (a Bethyloid), *Pepsis marginata* Burm.; Neuroptera—Two species of *Termes* not in our collection.

FISHES: *Menidia humboldti*, *Hudsonius altus*, *Characodon ferrugineus*, *C. atripinnis*, and *C. variatus*?

REPTILES: *Cinosternum rostellum* and *C. integrum*.

PLANT: *Chara fragilis* Desv.

MEADOW MOUSE, *Arvicola quasiaster*; also skull of specimen of the same species. SHELLS: *Helix*, *Anodonta* and corals, echinoderms, crustaceans, etc. 20097.

DULY, A. A. (U. S. National Museum), presented a chalcedony pebble taken from a drill well under the southwest pavilion of the Museum Building (20071), an oyster, *Ostrea virginica*, from Cornfield Harbor, Virginia (20231), and a specimen of marble from the Temple of Diana (20594); also gave rocks in exchange (19860).

DUNNINGTON, F. P. (University of Virginia), presented minerals. 20105.

DU PRÉ, D. A. (Spartanburgh, South Carolina), sent metallic iron for examination and report. 19586.

DURAND, JOHN (Paris, France), presented progressive proofs from A. B. Durand's engraving of Vanderlyn's "Ariadne." 20278.

DWIGHT, THEODORE F. (Ward, Delaware County, Pennsylvania), deposited pamphlet bound in glass folios, "Original Association of Congress, October 20, 1774," signed by forty-two delegates of the several colonies. 20719.

DYCHE, D. T. D. (Lebanon, Ohio), presented prehistoric stone implements, forty-five specimens, from Warren County, Ohio. 20174.

EAGLE, H. M. (Marietta, Pennsylvania), presented a lichen, *Cladonia pulchella*. 19502.

EASTERDAY, WILLIAM D. (Leesburgh, Virginia), presented a sandstone concretion. 20134.

EATON, J. M. C. (Irvington, New Jersey), presented a pouch of the Opossum, *Didelphys virginiana* (19466) and pupa of *Macrosila carolina* (19501).

EBERLE, EUGENE E. (Gainesville, Texas), sent a piece of pork infested with animalculæ, for examination and report. 20176.

ECHAUREN, FRANCISCO (through Carlos Zanartu, consul for Chili at Paris, France), presented a medal commemorating the war between Chili and Peru 1879-1883. 19961.

ECKFELDT, Dr. J. W. (Philadelphia, Pennsylvania), sent a collection of mosses and lichens from Germany in exchange. 19744.

EDWARDS, VINAL N. (Wood's Holl, Massachusetts), presented a Tiger Salamander, *Ambystoma tigrinum*. 19272.

(See also under Fish Commission, United States.)

ELLIOTT, F. O. (Catawba Springs, North Carolina), sent carved implements of soapstone, for examination and report. (Returned.) 20506.

ELLIS, CHARLES ROLAND (Washington, District of Columbia), presented an Alligator, *Alligator mississippiensis*, in the flesh. 20765.

- ELLIS, J. FRANK (U. S. Fish Commission), sent living specimens of Opossum, Gray Fox, Barred Owl, and Raccoon. 19866.
- ELLIS, L. H. (Wilmington, Ohio), presented insects. 20522.
- ELLSWORTH, E. W. (East Windsor Hill, Connecticut), presented samples of chipped window-glass. 20179.
- ELY, THOMAS N. (See under Pennsylvania Railroad Company, 20561.)
- EMMONS, S. F. (See under Interior, Department of the, U. S. Geological Survey, 20047, 20156.)
- EMONS, C. T. (Columbia, Pennsylvania), presented a fragment of a clay vessel representing a bird's head, from Lancaster county, Pennsylvania; also a soap-stone vessel representing a human face, from Dauphin County, Pennsylvania (20482); and sent fourteen arrowheads, hammer-stone, two grooved axes, celt, pestle, two notched sinkers, stone bead, bone perforator, jaw-bone of a deer, elk's tooth, bear's tooth, brass pendant, iron hatchet, etc., in exchange (19820).
- ENGLISH, G. L., & Co. (Philadelphia, Pennsylvania), sent smoky quartz crystals and a crocidolite quartz paper-weight. 20815.
- ERDTMANN, W. & H. (New York City), presented lithographs of paper currency of various countries, from the "Graphische Künste." 20237.
- ESTES, E. D. (Corning, Arkansas), presented specimens of *Dynastes tityus*. 19366.
- EUSTIS, Mrs. J. B. (Washington, District of Columbia), presented two living specimens of Barred Owl. 20778.
- EVERETT, Mrs. J. H. (Washington, District of Columbia), presented pearls from common oyster. 20476.
- FAETZ, Mrs. A. M. (Washington, District of Columbia), presented a miniature watch brought from Austria twenty-five years ago, and supposed to be a hundred years old; also a scarf-pin from Italy, brought to America fifty years ago. 19547.
- FAIRBANKS, E. & T., & Co. (St. Johnsbury, Vermont), presented a pair of prescription scales. 20738.
- FALCONER, J. M. (Brooklyn, New York), presented two Baxter oil-prints. 20666.
- FARIS, LAFAYETTE (Washington, District of Columbia), presented prehistoric stone implements, nine specimens, from Highland County, Ohio. 19771.
- FARRER, HENRY (New York City), presented nine etchings by the donor (20234); also illustrated catalogue of the N. E. Etching Club Exhibition, 1888 (20590).
- FAUCHER, G. L. (West Winsted, Connecticut), presented prehistoric stone implements. 19852.
- FILLEBROWN, F. E. (Boston, Massachusetts), presented eight proofs of wood engravings by the donor. 20829.
- FISCHER, Dr. HENRI A. (Washington, District of Columbia), presented a cut amethyst, from the Hartz Mountains, Germany. 20404.
- FISH COMMISSION, UNITED STATES, transmitted through Col. Marshall McDonald, Commissioner—
- Birds' nests and birds' eggs: *Quiscalus quiscula*, *Q. major*, *Merula migratoria*, *Molothrus ater*, *Dendroica aestiva*, *Agelaius phoeniceus*, *Setophaga ruticilla*, *Seiurus aurocapillus*, *Melospiza fasciata*, *Spizella socialis*, *Fireo noveboracensis*, *V. olivaceus*, *Compsothlypis americana*, *Clivicola riparia*, *Chelidon erythrogaster*, *Ceryle alcyon*, *Sterna dougalli*, *S. paradisica*, and *S. hirundo*. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 19426.
- Bones of Great Auk, *Alca impennis*. These represent several hundred individuals, and ten or twelve complete skeletons can be constructed from them. The Great Auk became extinct about fifty years ago. This collection of its bones is the largest in the world. Seventy-two skeletons and alcoholic specimens of birds, mostly sea-fowl, and many embryos of the same. Birds' eggs: *Sterna paradisica* (also seven nests), *Uria troile*, *Alca torda*, *Sula bassana*, *Fratercula arctica*, *Rissa tridactyla*, and *Oceanodroma leucorhoa*.
- A large collection of bird skins. Fishes: *Osmerus mordax*, *Ctenolabrus adspersus*, *Pleuronectes americanus*, *Cottus 18 spinosus*, *C. scorpius*, *Salvelinus fontinalis*,

FISH COMMISSION, UNITED STATES—Continued.

- Salmo salar*, *Phycis* (juv.), *Muraenoides gunnellus*, *Gasterosteus aculeatus*, and *Gadus* sp., from Newfoundland. Three skins, four skulls, and one alcoholic specimen of the Meadow Mouse, *Arvicola riparius*. Rocks from New Brunswick, Newfoundland, Magdalen, and adjacent islands. Copper ores from Newfoundland. Echinoderms, star-fishes, sea anemones, and crustaceans. Shells: among them *Natica heros*. Fossil shells from Pere Island, Canada, among these: *Spirifera*, *Chronetes*, *Eidospis*, and *Dalmonites*. Plants. (Collected during the cruise of the U. S. Fish Commission schooner *Grampus* in the summer of 1887, by Capt. J. W. Collins, of the U. S. Fish Commission, and Messrs F. A. Lucas and William Palmer, of the U. S. National Museum.) 19588.
- Fishes: One new Notacanthid and one new Ceratiid, and numerous collections from surface and deep water. 19640.
- Fish, *Thymallus tricolor*; also cray-fishes, from Wytheville, Virginia. 19653.
- Crabs, star-fishes, sea-urchins, and shrimps, from the vicinity of Great Egg Harbor, New Jersey. (Collected by Dr. T. H. Beau.) 19659.
- Rainbow Trout, *Salmo irideus*, from Wytheville, Virginia. 19713.
- A small collection of fishes from Wood's Holl, Massachusetts. Parasites and worms. (Through Vinal N. Edwards.) 19727.
- Two living specimens of the Great Blue Heron, *Ardea herodias*, from Havre-de-Grace, Maryland. (Through J. E. Brown.) 19873.
- Fishes: *Clupea astivalis*, and numerous young specimens of the fishes common to the coast of Massachusetts. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 19893.
- Birds. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) (19908, 19942, 19945, 19954, 20232, 20517.)
- Bird, *Urinator imber*. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 19910.
- A living specimen of the Rough-legged Hawk, *Archibuteo lagopus sancti-johannis*. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 19925.
- Spotted Cat-fish, *Ictalurus punctatus*. 19948.
- Fish, *Bubalichthys* sp., from the Mississippi River. 19984.
- Marine invertebrates, including Mollusks, two hundred and thirty lots: Crustaceans, worms, ascidians, bryozoans, echinoderms, coelenterates, and sponges. Collected during the summer of 1887, chiefly by the U. S. Fish Commission steamers *Albatross* and *Fish Hawk*. Diptera: Pupa of Culicid, from Wood's Holl, Massachusetts. 20000.
- Fishes: *Stolephorus*, *Serranus atrarius*, *Cynoscion regale*, *Pomatomus saltatrix*, and *Stenotomus argyrops*. Jaw of Sand Shark. Eggs of shark. Parasites, worms, and objects from surface towings. Seal-skin infested with lice. Two turtles. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20008.
- Lobsters and star-fishes from Wood's Holl, Massachusetts. Fishes: *Pleuronectes*, *Microgadus*, *Muraenoides*, *Cottus*, *Hemitripterus*, *Tautoga*, *Fundulus*, *Osmerus*, and *Ictalurus punctatus*. 20079.
- Piece of glass, five-sixteenths of an inch thick, broken by birds flying against it at Saukaty Head light-house, Massachusetts, October 28, 1883. 20120.
- Fishes: *Solea vulgaris*, *Phycis*, *Centropristis atrarius*, and *Onos cimbrius*, from Wood's Holl, Massachusetts. Feathers taken from the stomach of a Grebe. Intestinal worms, objects from surface towings, crustacean parasites, etc. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20125.
- Bird skins, *Larus delawarensis*, two specimens. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20131.
- A small collection of very young fishes common to Wood's Holl, Massachusetts. Birds: *Larus delawarensis*, *L. argentatus smithsonianus*, *Rissa tridactyla*, *Podilymbus podiceps*, *Harelda glacialis*, *Mergus serrator*, and *Somateria mollissima*. (Through Vinal N. Edwards.) 20257.

FISH COMMISSION, UNITED STATES—Continued.

- Bird skins: *Oidemia deglandii* and *Plectrophenax nivalis*. 20317.
 Specimens of the Red Cross-bill, *Loxia curvirostra*, and the Pine Siskin, *Spinus pinus*. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20405.
 A set of the publications of the U. S. Fish Commission exhibited at the London Fisheries Exhibition. 20411.
 Red Polls: *Acanthis linaria* and *A. l. holballii*. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20414.
 Porpoise, *Lagenorhynchus acutus*, from Wood's Holl, Massachusetts. (Through Vinal N. Edwards.) 20637.
 Birds from Wood's Holl, Massachusetts. (Through Vinal N. Edwards.) 20643.
 Sturgeon, *Acipenser sturio*, from Fort Washington, Maryland. 20659.
 Dusky Shearwater, *Puffinus stricklandi*, from Wood's Holl, Massachusetts. (Through Vinal N. Edwards.) 20673.
 Porpoise, *Lagenorhynchus acutus*. 20680.
 A living specimen of Loon. (Through Vinal N. Edwards, Wood's Holl, Massachusetts.) 20737.
 (See also under Capt. Z. L. Tanner, 19397; Messrs. Skinner & Sons, 20547.)
- FISHER, Dr. A. K. (Department of Agriculture), presented eleven birds' nests and eighty-five birds' eggs (19758); two specimens of Red-tailed Hawk, *Buteo borealis*, from Sandy Spring, Maryland (19863, 20432), and a living specimen of American Cross-bill (20169).
- FLAXMAN, H. (Pittsburgh, Pennsylvania), presented specimens of unbaked pottery, showing different stages in the manufacture of an inkstand. 20558.
- FLEMING, J. (Philadelphia, Pennsylvania), presented vessels and toys, from near Armenia, Salvador; from the collection of A. J. Sherzer; also fragments of pottery, from Salvador (19701); and Indian arrows, from Costa Rica (19819).
- FLETCHER, Dr. ROBERT, U. S. Army (Army Medical Museum), presented an agate seal-handle. 20080.
- FOLSOM, Dr. J. W. (Atoka, Indian Territory), sent indurated clay for examination and report. 19434.
- FOOTE, A. E. (Philadelphia, Pennsylvania), sent a collection of minerals. (A portion of the collection was purchased.) 20516.
- FORBES, R. B. (Boston, Massachusetts), presented water-colors and photographs of ships (20441); two models of life-boats (20704); and a model of boat provided with adjustable wheels for transportation overland; a device of the donor (20821).
- FORBUSH, E. H. (Worcester, Massachusetts), lent bird skins for comparison and study at the request of the Curator of Birds. 20576.
- FORD, FRANK (Washington, District of Columbia), presented a living specimen of Loon, *Colymbus torquatus*. 20453.
- FORRESTELL, JAMES (Bozeman, Montana), sent a collection of rocks. 20186.
- FORRISTER, GEORGE B. (New York City), presented a decoction of the leaves and root of a plant, a supposed antidote for the bite of rattlesnake. 19928.
- FORSBERG & MURRAY. (See under R. J. Thompson, 19636.)
- FOSTER, Mrs. MARY F. (Washington, District of Columbia), presented an Undulated Grass Parrakeet, *Melopsittacus undulatus*. 19558.
- FOX, Dr. W. H. (Washington, District of Columbia); presented eleven specimens of birds, representing eight species (19668); also sixty-five specimens of birds from Hollis, New Hampshire (19704).
- FRANCIS, JOSEPH (Washington, District of Columbia), presented a piece of timber from the ship *Ayrshire*, wrecked on the coast of New Jersey. 20391.
- FRASER, CHARLES A. (St. Domingo, West Indies), sent balsam of *Pterocarpus draco*, and leaves of a plant, for examination and report. 20698.

- FRASER, S. S. (Georgetown, South Carolina), presented fruit of *Phytilephas macrocarpa*. 20087.
- FRASER, WILLIAM LEWIS. (See under Century Company, 20108, 20196.)
- FREEMAN, F. L. (Baltimore, Maryland), presented photograph of asphalt diggings at Port Spain, Trinidad. 20452.
- FRENCH & KENNEY (Salmon City, Idaho), sent fossil bones for examination and report. 20655.
- FRENCH, CHARLES E. (Jacksonville, Texas), sent sand for examination and report. 20682.
- FRESHWATER, J. (Loudonville, Ohio), presented a leaf-shaped stone implement. 20189.
- FRICTSCH, E. (New York City), presented alabaster from England, *brèche violette* marble from Italy, and onyx from Mexico. 19678.
- FROST, L. L. (Susanville, California), presented prehistoric stone implements, twelve specimens. 20462.
- FRY, Capt. F. G. (New Orleans, Louisiana), sent the skeleton of a Gorilla. 20532.
- FURGUESON, T. E. (Washington, District of Columbia), presented the trunk of a sapling with a rock ingrown. 19936.
- GALE, DENNIS (Gold Hill, Colorado), presented birds' eggs, a valuable collection containing rare species; also birds' nests and bird skins. 19970.
- GALLAHER, J. W. (Pulaskiville, Ohio), presented a badge of the Fourteenth Regiment, Ohio National Guard. 19613.
- GALVIN, CHARLES D. (New York City), sent a water-worn fragment of hydrated sesquioxide of iron for examination and report. 20032.
- GAMAGZ, A. T. (Damariscotta, Maine), presented prehistoric stone implements. 20251.
- GANT, A. (Washington, District of Columbia), presented a Red-shouldered Hawk, *Buteo lineatus*, from Eastern Branch, Maryland. 19657.
- GANT, CHARLES B. (Washington, District of Columbia), presented a living specimen of Loon, from Colonial Beach, Potomac River. 20259.
- GARDNER, Dr. P. (Gallipolis, Texas), sent a clay concretion, supposed to be a petrified mammal, for examination and report. 19932.
- GÄRNER, R. L. (Salem, Virginia), presented magnetite crystals from Virginia. 19907.
- GARRISON, H. L. (Cedarsville, New Jersey), presented fulgurites. 20133.
- GAWTHORP, J. E. (Huttonsville, West Virginia), sent ore for examination and report. 20501.
- GAY, Dr. C. A. (Lewiston, Idaho), presented a pair of antlers of the Mule Deer, *Cerviculus macrotis*, in the velvet; also sent a living specimen of Mule Deer. 19878.
- GEDZ, AUGUST (Washington, District of Columbia), presented a living specimen of Screech Owl from Maryland. 20098.
- GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA lent fossils for comparison and study at the request of the Curator of Paleozoic Fossils. 19951.
- GEORGE, J. A. (See under Russell Thorpe, 20082.)
- GERE, J. E. (Riceville, Wisconsin), presented prehistoric stone implements: three flakes, three cutting implements, four scrapers, one perforator, six spear-heads, fifty-seven arrowheads, one pierced tablet, and five leaf-shaped implements; also fossils, mostly corals, from the Niagara formation (Upper Silurian). 20653.
- GERNERD, J. M. M. (Muncy, Lycoming County, Pennsylvania), presented prehistoric stone implements, one hundred and fifty specimens. 20191.
- GERRARD, EDWARD (London, England), sent specimens of *Simia satyrus*, male and female, in exchange. 20677.
- GIFFORD, R. SWAIN (New York City), presented fourteen etchings by the donor. 20285.

- GILBERT, Prof. CHARLES H. (Cincinnati, Ohio), presented a collection of fishes from the vicinity of Cincinnati. 20670.
- GILDER, RICHARD W. (See under Augustus St. Gaudens 20084.)
- GILLIAM, R. (Petersburgh, Virginia), presented a "Queen Anne" shilling of Great Britain, 1711. 20387.
- GILLILAND, A. L. (Mead Centre, Kansas), presented a photograph of an "idol" from New Mexico. 19392.
- GLENNAN, Dr. P. (Washington, District of Columbia), presented a living specimen of Virginia Deer, *Cariacus virginianus*, from Florida. 20464.
- GODMAN, M. M. (Dayton, Columbia County, Washington), sent ore for examination and report. 19735.
- GODMAN, T. D., and O. SALVIN (London, England), presented a valuable collection of Coleoptera, containing named *Carabidae* and *Longicornia* from Central America, determined by H. W. Bates and typical of many of the species described in the "Biologia Centrali Americana." 20007.
- GOFF, Hon. N. (See under Jacob Whitlach, 20426.)
- GOLDEN, R. A. (Washington, District of Columbia), presented a specimen of Trigger Fish, *Balistes capriscus*, from Virginia Beach. 20724.
- GOLDFUSS, OTTO (Halle an der Saale, Germany), sent ninety species of land and fresh-water shells from Asia Minor, Greece, and the Crimea. 20372.
- GOODALL, F. H. (Washington, District of Columbia), presented a fragment of a 100-pound shell, found imbedded in a sycamore tree on the farm of J. S. Fenwick, near Washington, a relic of the war of 1861-'65. 20811.
- GOODE, G. BROWN (Assistant Secretary, Smithsonian Institution, in charge of United States National Museum), presented a Wood Thrush, *Turdus mustelinus*, killed by flying against the telegraph wires in Smithsonian grounds (19568); a Wood Rabbit, *Lepus sylvaticus*, from the District of Columbia (20580); and an Arkansas bowie-knife (20757); deposited old Japanese armor, consisting of two cuirasses, two taces (odd), two pairs epauliers (mates), one pair brassarts, one pair greaves, two greaves (odd), one piece of brassart, one *couvre de nuque*, one flat helmet, and two neck pods, nineteen pieces in all (20368); and purchased, on behalf of the Museum, lacquerware, porcelain, and bronzes (20197).
- Goss, N. S. (Topeka, Kansas), presented two new species of *Sula* (two specimens of each) from California; also eggs of *Sula brewsteri* Goss, *S. gossi* Ridg., and *Phaethon whereus*, from San Pedro Martin Island, California (20540); and sent bird skins for examination and report (19389).
- GOULD, A. L. (Watertown, New York), sent a fragment of the breast-bone of a horse for examination and report. 19809.
- GOWARD, GUSTAV (Washington, District of Columbia), deposited a Corean pipe-stem and twenty-five original sketches by Japanese artists. 19374.
- GRAMM, OTTO (Laramie, Wyoming), presented a specimen of Rocky Mountain Whitefish, *Coregonus Williamsoni*. 19650.
- GRANT-BEY, Dr. JAMES (Cairo, Egypt), presented a most valuable collection of ethnological and other objects. Among these may be mentioned: Gold ornaments of Thothmes III., 1600 B. C., bought in Cairo some years before the discovery of the mummies at Deir el Bahari; flower of the lotos of Upper Egypt, *Nymphaea cerulea*; mummied hawk; modern Arabic almanac for the year of Heijra 1300; aromatic substance taken from the abdomen of a mummy at Thebes; piece of a glass ornament from a sarcophagus of the nineteenth dynasty; mosaic from Leptis Magna; model of a head-rest in hematite, twenty-ninth dynasty; beetle from Thebes; cat made of copper, and symbolical of Pasht, the later form of the goddess Sekhet; coin from the kingdom of Harrar, southeast of Abyssinia; early Turkish coin upon which is inscribed "In name of God most compassionate;" cali-

GRANT-BEY, DR. JAMES—Continued.

phate coin of Bagdad; ancient Egyptian duck, in bronze; small scarab, in stone (Head of Hathor supported by two royal symbols); fragment of a ring of ancient porcelain; ancient Egyptian model of pottery; Egyptian porcelain ring of lotos flower and necklace of Sekhet; stele of Horus (none older than the twenty-sixth dynasty); Thoth (ibis-headed god Hermes, god of learning); uræus, kingly emblem in bronze, originally in king's crown; papyrus from Fyoum, written in Greek; bandages of mummies, of different textures, containing inscriptions in hieratic (part of "Ritual of the Dead"); fragments of mummy bandages (names of Cleopatra, Ptolemy, and Khufa inscribed thereon by Dr. Grant-Bey); bronze lizard from a mummy-case (now empty, originally filled with the bones of small animals); bronze figurette of Osiris; ancient mold of Ra Atum, god of sunset; shubti or respondents (images in porcelain); copy of ancient Greek coin with head of Athena; Roman coins; modern Turkish coins in silver and gold; charm against disease for donkey; fragment of mummy cloth from body of Rameses, father of the Pharaoh of the Exodus (nineteenth dynasty, 1500 B. C.); fac-simile of royal cartouch inscribed thereon by Dr. Grant-Bey; also Egyptian "Book of the Dead," in hieratic, fifteen fragments; and other objects (19601, 19747, 20440).

GRAVES, Hon. E. O. (Chief of Bureau of Engraving and Printing, Washington), presented illustrations representing the paper currency of France, Germany, Italy, and other countries, from the "Graphische Künste." 20184.

GRAVES, MILES W. (Hartford, Connecticut), deposited Roman copper coins, tin coin of Turkey, and miscellaneous silver coins; forty-three in all. 20664.

GREBNITZKY, N. (Behring Island), presented skull of adult whale and skeleton of young whale, *Ziphius grebnitzkii*; a collection of fishes, including *Cottus diceraus*, *Gasterosteus microcephalus*, *G. pungitius*, and *G. pungitius brachypoda*; crustaceans, worms, echini, sponges, and shells. 20056.

GREEN, CHARLES S. (Roaring Branch, Pennsylvania), presented a ribbon badge of Blaine and Logan Club of Roaring Branch, 1884. 19718.

GREEN, G. K. (New Albany, Indiana), presented prehistoric stone implements, including fourteen paleolithic specimens, from an ancient burying ground at Clarks-ville, Indiana (20362); also eight additional specimens (20633).

GREEN, J. A. (Ooltewah, Tennessee), sent, for examination and report, four specimens of German Carp, *Cyprinus carpio*, from Ooltewah, together with samples of the water of a pond in which the fish were found dead. 20198.

GREEN, LOREN W. (Baird, Shasta County, California), presented ores. 20322.

GREENE, W. E. (Warren, Ohio), sent clay for examination and report. 19403.

GREENWOOD, E. C. (Padre Island, Texas), presented a specimen of Wilson's Phalarope, *Phalaropus tricolor*. 20104.

GREENWOOD POTTERY COMPANY (Trenton, New Jersey) presented specimens of pottery of American manufacture. 20109.

GREEY, EDWARD (New York City), presented a large bronze figure of a Japanese Buddha; also a Japanese fire-engine, and bow and arrows. 21176.

GREGORY, J. R. (London, England), presented three specimens of meteoric iron and three specimens of meteoric stone. 19918.

GRIFFIN, Hon. G. W. (See under Australian Museum, New South Wales (20773); also under Technological Museum, New South Wales (20798).

GRINNAN, A. G. (Madison Mills, Virginia), sent a specimen of fungus found between bark and wood of dried pine, for examination and report. 19656.

HADFIELD, ROBERT (Sheffield, England), presented specimens of manganese steel from Sheffield. (Through J. D. Weeks, Pittsburgh, Pennsylvania.) 19905.

HAKES, W. A. (Binghamton, New York), sent fragments of pottery and arrow-points in exchange. 20521.

HALL, Prof. ASAPH. (See under National Academy of Sciences, 19831.)

HALL, CHARLES (Templeman's Cross Roads, Virginia), presented two eggs of common barn fowl, abnormal. (Through C. W. Ridley.) 19549.

- HAM, C. D. (Dubuque, Iowa), presented a roster and historical sketch of the "Governors Greys," Company A, Fourth Regiment Iowa National Guard, and badge of same organization worn on the occasion of the Philadelphia Centennial Celebration, September 15-17, 1887. 19622.
- HAMILTON, M. (Savannah, Georgia), sent a tincture of the milkweed *Asclepias amplexicaulis*, a reputed antidote for rattlesnake bite. 20573.
- HAMLIN, R. H. (Brunette Post-Office, Louisiana), sent a fine specimen of a "muller" stone for examination and report. 19427.
- HAMLIN, WILLIAM C. (Havre de Grace, Maryland), presented a living specimen of Marsh Hawk, *Circus cyaneus hudsonius*. 19865.
- HAMPSON, THOMAS (U. S. Geological Survey), presented a concretion, from the District of Columbia. 20110.
- HAMPTON, W. C. (Mount Victory, Ohio), sent rock supposed by the sender to be of meteoric origin, also a boat-shaped object, for examination and report. 19461.
- HAMY, Dr. E. (See under Trocadéro Museum, 19985.)
- HANKS, HENRY G. (San Francisco, California), sent in exchange hanksite and glau-berite. 20068.
- HANNA, H. W. (Warsaw, Indiana), presented a collection of prehistoric stone implements from Wabash County, Indiana, containing some paleolithic specimens. (20180, 20717.)
- HARDESTY, Dr. J. R. S. (Washington, District of Columbia), presented a pair of antique spectacles. 19782.
- HARLAN AND HOLLINGSWORTH COMPANY (Wilmington, Delaware) presented photographs of cars built by the company. 20509.
- HARPER AND BROTHERS (New York City) presented twenty-eight wood engravings (20301), and prints showing wood engraver at work (20591); also sent specimens of engravings on wood by members of the Society of American Wood Engravers, twenty-five plates with text. 20828.
- HARRIS, T. C. (Raleigh, North Carolina), presented rocks. 19524.
- HARRIS, THEODORE S. (Sea Bright, New Jersey), presented Orange Tile-fish, *Alutera schœpfi*, and Banded Rudder-fish, *Seriola zonata*; also "slipper" of a Pteropod called *Cymbulia*. 19408.
- HARRISON, S. R. (Clarksburgh, West Virginia), presented hickory leaves with a deposit of "honey dew." 20767.
- HARRISON, V. T. (Texarkana, Arkansas), sent sandstone containing pyrite and lignite (19850); also galena in quartzose gangue for examination and report (19897).
- HART, CHARLES HENRY (Philadelphia, Pennsylvania), presented engravings by D. Edwin, John Cheney, and others; and mezzotints, lithographs, etc. 20273.
- HARTLEBEN, C. A. von (Washington, District of Columbia), presented specimens of old forms of dental instruments. 19964.
- HAYNERS, Col. W. H. (Capon Springs, West Virginia), presented an Albino Blue-bird, *Sialia sialis* (through H. C. Baker, Wardensville, West Virginia) (19449); also specimen of Loggerhead Shrike or Butcher-bird, *Lanius ludovicianus* L. (through H. C. Towers). (19597.)
- HAWLEY, A. H. (Los Gatos, California), presented bird skins, and sent bird skins for examination and report. 20442.
- HAY, C. D. (Hot Springs, Arkansas), sent stone bearing marks due to weathering for examination and report. 19677.
- HAYDEN, Mrs. EMMA V. (Philadelphia, Pennsylvania), presented medals awarded to Dr. F. V. Hayden by various scientific and commercial bodies. 20446.
- HAYWARD, W. H. (Washington, District of Columbia), presented two English coins, one-third farthing. 19921.
- HAYWOOD, HOWARD (Raleigh, North Carolina), presented a collection of prehistoric stone implements, including eight paleolithic implements. 20357.

- HAZEN, Mrs. MILDRED McLEAN (Washington, District of Columbia), presented ethnological objects. Among these may be mentioned: Woman's fur dress, breeches, man's fur coat and breeches, rain coat, one pair of woman's boots, girdle ornamented with claws, and one pair of shoes, from St. Michael's, Alaska; Indian beaded coat and pair of shoes, from Yukon River, Alaska, three kyaks, from Greenland; one kyak, from Norton Sound; also Indian pipes and other specimens. 20458.
- HEALY, Capt. M. A., U. S. Revenue Marine. (See under Treasury Department, U. S. Revenue Marine, 19774).
- HEATON, L. D. (Victoria, Texas), presented a specimen of spider, *Gasteracantha* sp., new to the collection. 19539.
- HEINMANN, E. (New York City), presented ten specimens of wood engraving, the work of the donor. 20271.
- HEITMULLER, ALFRED (Oak Grove, District of Columbia), presented a living specimen of the Sparrow Hawk. 20812.
- HELTON, W. E. (Hazel Springs, Virginia), sent mica for examination and report. 19534.
- HEMPHILL, HENRY (San Diego, California), presented shells: *Planorbis*, from Louisiana, and *Ceropsis minima* Dall, from California (20543); and lent shells for comparison and study at the request of the Curator of Mollusks (20166, 20739).
- HENDRICKS, Mrs. C. I. (Philadelphia, Pennsylvania), presented a sample of modern Brussels point-lace. 20519.
- HENSHAW, H. W. (U. S. Geological Survey), presented a collection of plants—asters and oaks. 19762.
- HENSON, HARRY V. (Hakodate, Japan), lent skins of Japanese birds for comparison and study at the request of the Curator of Birds. 19405.
- HENSON, SAMUEL (London, England), sent calcite and celestite with calcite and sulphur. 19883.
- HEPNER, J. H. (Mount Jackson, Virginia), sent limestone for examination and report. 20112.
- HERMANN, Hon. BINGER. (See under Capt. R. A. Bensal, 20004.)
- HERRON, Dr. CHARLES S. (Bartow, Florida), presented a molar tooth of a Mammoth, *Elephas primigenius* (20431); also a specimen of whorled milkweed, *Asclepias verticillata*, a reputed cure for rattlesnake bite (20748).
- HERZER, H. (Cleveland, Ohio), presented a valuable and interesting collection of fossil plants containing some new species. 20261.
- HESEL, Dr. R. (Washington, District of Columbia), presented a Red-tailed Hawk, *Buteo borealis* (20230); also a Dachshund (20455).
- HICKOK, FRANK (Caldwell, Kansas), presented a jaw-bone of *Equus caballus* with last inferior left molar. 19519.
- HICKS, THOMAS R. (Brooklyn, New York), presented a "Lizard Fish," *Synodus foetens*, from Bay of Canarsie, New York. 19573.
- HIDDEN, W. E. (Newark, New Jersey), presented four crystals of black tourmaline (19787); also xanthitane from Green River, North Carolina (20157).
- HIGGINS, Dr. C. W. (Salt Lake City, Utah), presented living specimens of Badger, of Red Fox, and of Golden Eagle; and sent two living specimens of Spotted Lynx. 19872.
- HILL, JOHN HENRY (Mount Moor, New York), presented two etchings by the donor, and two aquatints by J. Hill. 20281.
- HILL, ROBERT T. (U. S. Geological Survey), presented two living specimens of Tortoise, *Cistudo carolina tringuis*. 20779. (See also under Cummings, W. F.)
- HILL, W. S. (Oswego, Kansas), presented prehistoric stone implements, one hundred and eight specimens, from Labette County, Kansas (19484); also a cupped stone (19826).

- HINCKLEY LOCOMOTIVE COMPANY (Boston, Massachusetts), (through F. D. Childs, manager) presented photographs of the locomotive "Lion," built by the company in 1884. 20408.
- HINE, L. G. (Washington, District of Columbia), presented lignite. 19923.
- HINMAN, H. E. (Cleveland, Ohio), presented a living specimen of Fox Squirrel. 20596.
- HINMAN, M. L. (See under Brooks Locomotive Works, 20506.)
- HITCHCOCK, Prof. C. H. (Hanover, New Hampshire), sent a relief map of Oahu in exchange. 19999.
- HOBBS, W. H. (Worcester, Massachusetts), sent rocks from near Ilchester, Maryland, in exchange. 20700.
- HOCKHAUS, F. W. (Communia, Clayton County, Iowa), sent gypsum for examination and report. 19428.
- HODGE, E. B. (Plymouth, New Hampshire), presented a specimen of trout, *Salvelinus agassizi*. 19898.
- HOB, R., & Co. (New York City), presented illustrations of wood-cut and type printing machinery manufactured by the donors. 20622.
- HOFFMAN, J. B. (Cincinnati, Ohio), presented badges of the Fifth Ohio Volunteer Infantry. 19628.
- HOLBERT, J. C. (Corydon, Kentucky), sent insect for name. 20022.
- HOLMES, WILLIAM H. (Bureau of Ethnology) presented two medals made by J. A. Bolen, Springfield, Massachusetts. 19369.
- HOOD, H. D. (Bay Ridge, Florida), presented material taken from the stomach of an alligator: pine knots, turtle shells, bones, etc. 19355.
- HORAN, HENRY (U. S. National Museum), presented a medal of the Industrial Exposition held in Minneapolis, Minnesota, 1887. 19629.
- HORNADAY, W. T. (U. S. National Museum) presented antlers of Elk, skins of Antelope kids, and skin of Grizzly Bear cub (19880); two skins of Opossum (20042); an interesting and valuable collection of fossil woods from Egypt and from Antigua, West Indies, and other localities rarely visited (20188); and two postage-stamps of Borneo (20242); also sent living specimens of Cinnamon Bear, White-tail Deer, Columbian Black-tail Deer (19879); Gray Squirrel, Flying Squirrel (19894); Cooper's Hawk (20049); Prairie Hare and Opossum (20244).
- HOSKIN, ROBERT (Cranford, New Jersey), presented eleven specimens of wood engravings by the donor. 20268.
- HOUGH, WALTER (U. S. National Museum), presented 5-cent nickel of 1883, without the word "cents" inscribed thereon (20235); two etchings from a German book, "Historische Chronicken," of the seventeenth century (20450); and pearls from the common oyster (20459).
- HOVENDEN, THOMAS (Philadelphia, Pennsylvania), presented two etchings by the donor. 20274.
- HOWARTH, Prof. ELIJAH (curator Weston Park Museum, Sheffield, England), presented photograph of Sheffield cutlery of the eighteenth century and prior thereto. 20401.
- HOXIE, Capt. R. L., U. S. Army (Montgomery, Alabama), presented a living specimen of Virginia Deer. 20707.
- HOY, Dr. P. R. (Racine, Wisconsin), presented a specimen of White-marked Shrew, in the flesh. 20094.
- HUDDLESON, GEORGE (Montgomery County, Maryland), presented a specimen of quartz containing free gold. 20333.
- HUNTER, WILLIAM (Woodland, Virginia), presented a specimen of fungus, *Polyporus*. 20706.
- HURTER, JULIUS (St. Louis, Missouri), presented one specimen each of *Aspidonectes*, *Bufo*, *Eumeces*, and *Tropidonotus*. 19965.
- HYATT, Dr. P. F. (Lewistown, Pennsylvania), presented a specimen of native sal-ammoniac. 20701.

- HYDE, GEORGE BYRON and W. B. HYDE, (Morrisville, Vermont), presented two stone images, and a spindle and loom, from Pueblo, Mexico. 19708.
- HYDE, W. B. (See under George Byron Hyde. 19708.)
- ILLINOIS STATE LABORATORY OF NATURAL HISTORY, (Champaign, Illinois) presented specimens of Lepidoptera, and sent a collection of Lepidoptera for determination. 20395.
- INDIANA STATE UNIVERSITY (Bloomington, Indiana), through Prof. D. S. Jordan, presented fossils, Silurian, Devonian, and Carboniferous, types of twenty-two species (fifty-three specimens) described by Dr. D. D. Owen in his report on the geology of Wisconsin, Iowa, and Minnesota; also three hundred and twenty-seven other specimens of forty-two genera and sixty-five species, Cretaceous fossils from Arkansas and Nebraska; type specimens of Owen's Second Report Geological Reconnaissance of Arkansas, 1860, and Owen's Report of the Geological Survey of Wisconsin, Iowa, and Minnesota, 1852; fossil turtles including *Testudo oweni*, *T. culbertsonii*, *Archæotherium mortoni*, *Rhinoceros* sp., and *Oreodon culbertsonii*, and a collection of shells. 19889.
- INTERIOR, DEPARTMENT OF THE, U. S. Geological Survey (through Maj. J. W. Powell, Director) transmitted—
- Fossil bones of *Zenoglossodon*, collected by Frank Burns. 19554.
- Fossils from Iuka, Mississippi, collected by L. C. Johnson. 19555.
- Fossils and rocks from Lake George, New York. (Through C. D. Walcott.) 19845.
- Rocks from New Jersey, collected by Frank Burns. 19849.
- Fossils and minerals. (Through R. E. C. Stearns.) 19911.
- A specimen of *Ptychodus mortoni* Agassiz. (Through W. H. Dall.) 19976.
- Rocks and ores from Leadville, Colorado. Collected by S. F. Emmons. 20047.
- Minerals. Collected by Whitman Cross and W. F. Hillebrand. Rocks and ores from Leadville, Colorado. (Through S. F. Emmons, Denver, Colorado.) 20156.
- Cambrian fossils from Mount Stephens, Rocky Mountains, near line of Canadian Pacific Railroad. 20409.
- Vertebrate fossils. (Through W. H. Dall.) 20733.
- A fossil fish. Collected by C. D. Walcott. 20789.
- (See also under Dr. Byrne, U. S. Army, 20069; W. Q. Brown, 20303; Mr. McDonald, 20337; C. W. Cunningham, 20339.)
- JACK, W. H. (Natchitoches, Louisiana), sent siliceous pebbles cemented by oxides of iron and manganese, for examination and report. 20394.
- JACKSON, E. E. (Columbia, South Carolina), presented a wax cast of a pipe found in a mound near Columbia. 19413.
- JACKSON, F. WALCOTT. (See under Pennsylvania Railroad Company, 20494.)
- JACKSON, THOMAS H. (West Chester, Pennsylvania), presented a nest and four eggs of *Helmitherus vermivorus*. 19950.
- JACKSON, W. W. (Washington, District of Columbia). A living specimen of Mink. (Purchased.) 20089.
- JACOBS, ELMER T. (Morgantown, West Virginia), sent bird skins for examination and report. 20347.
- JACOBS, S. M. (Gloucester, Massachusetts), presented a fragment of oak plank, from schooner *S. P. Agnew*, perforated by ship-worms. 19806.
- JAGGERS, J. A. (Garnettsville, Kentucky), presented a prehistoric stone implement. 19867.
- JAMES, Hon. CHARLES P. (Washington, District of Columbia), presented a framed photograph of an oil-painting of Professor Charles Upham Shepard. 20513.
- JAMES, S. H. (Mound Station, Louisiana), sent a coin for examination and report. 20514.
- JAMISON, H. K. (Manayunk, Pennsylvania), presented a nest and four eggs of *Dendroica discolor* from Virginia. 19974.

- JEFFERS, ISAAC S. (Huffman, Indiana), sent sandstone for examination and report. 19564.
- JEFFERSON, MARY ELIZA (Norbeck, Maryland), presented prehistoric stone implements, forty-four arrowheads. (Through John W. Jefferson.) 19399.
- JEFFERSON, JOHN W. (See under Mary Eliza Jefferson, 19399.)
- JEFFRIES, Dr. J. A. (Boston, Massachusetts), presented a specimen of Purple Sand-piper, *Tringa maritima*. 20436.
- JENKS, Prof. J. P. W. (Brown University, Providence, Rhode Island), presented a Chinese rat-trap. 19589.
- JENSEN, LAWRENCE (Gloucester, Massachusetts), sent a model of a full-rigged ship. 20764.
- JOHN, ANDREW, Jr. (Carrollton, New York), presented two silver brooches made by the Seneca Indians. 20224.
- JOHNSON, J. B. (Howard University, Washington, District of Columbia), deposited an original deed of land from the United States to James G. Johnson. 20312.
- JOHNSON, J. T. (Johnson Junction, Kentucky), presented a boat-shaped implement. (Through S. S. Dudley.) 20557.
- JOHNSON, L. C. (See under Interior, Department of the, U. S. Geological Survey, 19555.)
- JOHNSON, W. F. (Bladensburg, Maryland), presented a living specimen of Woodcock, *Philohela minor*. 20329.
- JONES, T. D. (Jacksborough, Texas), sent ore for examination and report. 19810.
- JORDAN, Prof. D. S. (Bloomington, Indiana), presented the head and fins of *Salvelinus namaycush*, from British Columbia (19979); also a specimen of *Xyrichthys jessie* (type) Jordan, collected by C. H. Bollman off Tampa Bay, Florida (20145). (See also under Indiana State University.) 19889.
- JOUY, P. L. (Smithsonian Institution), presented a "chung sung," or road-side sign-post, from Corea (19537); hair-pins made of shells, *Echinus* spines, fish-bones, etc., by the wives and daughters of the fishermen at the island of Enoshima, Japan (19616); Corean axe, from Tusan, southern Corea (19638); bow and three arrows, also implement for boring pipe-stems (19792); cast of face of an ancient statue of Buddha, from southern Corea (19825); bird skins, fifteen specimens, including fourteen species, from China, also model of a Malay boat from the Straits of Malacca (20114); skull of porpoise, *Delphinus delphis*, from Corea, also skeletons of birds, including *Grus viridirostris*, *Thalassæetus pelagicus*, *Falco monachus*, *Diomedes brachyura*, and *Bubo maximus* (20150), and twenty-nine specimens, comprising twenty-four species, from China (20220); gave a specimen of Amherst's Pheasant, *Phasianus amherstiae*, in exchange (19813); and sent a collection of Corean pottery and Corean medicines (20161).
- KANG CHIN-HI (Corean Embassy, Washington, District of Columbia), presented five bronze coins of Corea. 20254.
- KAPPES, ALFRED (New York City), presented a study in charcoal by the donor. 20276.
- KAUFFMANN, RUDOLPH D. (Washington, District of Columbia), presented a Hound Shark, *Mustelus* sp., having two heads, two vertebral columns, two pairs dorsals, one pair pectorals and ventrals, and one anal. 20571.
- KEACH, M. A. (Providence, Rhode Island), presented shells, young of *Litorina rudis* L. and *Odostomia*, from Kettle Point, Rhode Island. 19761.
- KEELING, W. S. (Garrett's Bend, West Virginia), sent rocks for examination and report. 19749.
- KEMP, J. F. (Cornell University, New York), sent rocks in exchange. 19987.
- KEPPEL, FREDERICK, & Co. (New York City) sent prints of various kinds. 20803.
- KERCHEVAL, ANDREW (Romney, West Virginia), sent anthracite coal, decomposed stone, etc., for examination and report. 19753.
- KERR, D. C. (Smithsonian Institution), presented a specimen of Purple Grackle, *Quiscalus quiscula*. 20437.

- KILHAM, L. C. (Clifton Springs, New York), sent a specimen of fertilizer for examination and report. 20518.
- KIMMEL & VOIGT (New York City), presented sixteen impressions from an etched plate to illustrate the process of etching printing. 20297.
- KING, Rev. GEORGE C. (East Weymouth, Massachusetts), presented a copper coin, (20 centissimos of Uruguay, 1885). 20512.
- KING, F. C. (Clifton Springs, New York), sent a specimen consisting of a mixture of siliceous sand and carbonate of lime, also samples of a deposit from a lake in central Florida, for examination and report (20406, 20520).
- KING IRON BRIDGE MANUFACTURING COMPANY (Cleveland, Ohio) presented cyanotypes of bridges constructed by the company. 20496.
- KING, JOHN (Kissimmee, Florida), sent an insect for name. 20652.
- KLACKNER, C. K. (New York City), presented three etchings and one wood engraving. 20288.
- KLOCZEWSKI, A. M. (Washington, District of Columbia), deposited Polish silver coins: Piece used as a charm, 1652; Stanislaus Augustus, 1788; Sigismund III., 1623; and Sigismund III., 1622. 19675.
- KNIGHT, W. C. (Nimrod, Arkansas), sent minerals for examination and report. 19550.
- KNOWLES, Capt. HERBERT M. (U. S. Life-Saving Station, Point Judith, Rhode Island), presented two specimens of the young of the "Grouper," *Epinephelus niveatus* (19590), also a "File-fish," *Alutera schæpfi* (19633).
- KNOWLTON, F. H. (U. S. National Museum), presented a prehistoric stone implement; a collection of plants, representing more than one hundred New England species; ores; fossils from Vermont; and contorted schist from Vermont. 19395.
- KNOWLTON, JAMES E. (Damariscotta, Maine), presented seventeen specimens of prehistoric stone implements, paleolithic, from Lincoln County, Maine. 20612.
- KNUDSEN, VALDEMAR (Boston, Massachusetts), presented bird skius from the Hawaiian Islands, including the "Kioeo," a rare bird in the islands, and supposed not to nest there; the "Koloa" (Hawaiian for duck); the "Noro," which lives in the rocks along the coast; the "Wau," formerly abundant every summer in the mountains at as high an altitude as 5,000 feet; the "Akeke," *Calidris arenaria*, and the "Aeo," *Himantopus*; also two specimens of Bat, *Atalapha semota*, from the same locality. 20560.
- KOEHLER, S. R. (U. S. National Museum), presented etchings, dry-points, wood-cuts, etc., thirty specimens (20293); "The Graphic Arts," by Philip Gilbert Hamerton (20302); three specimens of fossil fishes and sixteen specimens of fossil invertebrates, from Solenhofen, Bavaria (26417); early German lithographs and wood engravings by Henry Marsh (20587); wood-cut portraits of eminent men (20469); and four etching tools (20604).
- KUEHLING, Miss LIZZIE (Lorton Valley, Fairfax County, Virginia), presented a living specimen of Hawk, from Pohick Church. 20813.
- KUMMERFIELD, J. F. (Minden, Iowa), presented prehistoric stone implements from Pottawattamie County, Iowa. 19510.
- KUNZ, GEORGE F. (Hoboken, New Jersey), presented a polished slab of obsidian; tourmaline crystals, from De Kalb, New York; brown tourmaline, from Hamburgh, New Jersey; sun-stone, from near Franklin, North Carolina; polished specimen of crocidolite quartz, from Griqualand, South Africa; two polished specimens of bowenite, from Smithfield, Rhode Island, and fragments of red and green tourmaline, from Calhao, Province of Minas Geraes, Brazil (19805); meteorites, two specimens (19916); elaeolite syenite, from near Hot Springs, Arkansas (19986); chlorophane, moonstone, spessartite, beryl crystal, Amazon stone, crystallized albite, transparent oligoclase, and muscovite crystals in Amazon stone (20308); also deposited ten adze and axe handles, from New Guinea (20083), and sent in exchange two meteorites (19916).
- LAMB, J. E. (Huntington, Oregon), sent galena and pyrites for examination and report. 20665.
- LAMB, T. S. (Portland, Maine), presented pegmatite from Auburn, Maine. 19749.

- LANE, SYLVANUS (Hillsborough, Ohio), sent a specimen of crude petroleum for examination and report. 19538.
- LANG, JOHN C. (Washington, District of Columbia), deposited the original patent granted to John Fitch, of Philadelphia, by Louis XVI., of France, in 1791, "for propelling boats by the force of steam;" young of Sea-otter, *Enhydris lutris*; and a carved wooden image from South Sea Islands. 20791.
- LANGE, CHARLES T. (Hancock, Dakota), sent a specimen of magnetic iron ore for examination and report. 19723.
- LATTIN, FRANK H. (Albion, New York), sent zoisite from New York for examination and report. 19903.
- LAWRENCE, GEORGE N. (New York City), presented eggs of *Eulampis holosericeus* and *Bellona exilis* (19412); also sent three specimens of Bachman's Warbler, *Helminthophaga bachmanii*, from Louisiana (20782).
- LAZIER, Capt. HENRY B. (Morgantown, West Virginia), deposited a soldier's medal, honorable discharge, of the State of West Virginia. 19582.
- LEA, Dr. ISAAC (deceased), through Mrs. M. J. Chase, Philadelphia, Pennsylvania, bequeathed a collection of shells containing about two thousand specimens; about four hundred specimens of mesozoic fossil shells; fossils, including sixty-four genera, one hundred and twenty-four species of American fossils from all horizons, and about ten genera and fifteen species of foreign fossils of the same range, and worm tubes and barnacles taken from mangrove oysters in the Island of Cuba (20525); also a large collection of minerals (20423).
- LEARY, J. L. (Thoroughfare, Virginia), sent micaceous hematite and mica schist (19937); also magnetite in decomposed schist (20672) for examination and report.
- LEGERT, L. H. (Evanston, Wyoming), presented a specimen of coal. 19505.
- LEMON, JOHN H. (New Albany, Indiana), presented sixty-nine specimens of prehistoric stone implements from Floyd County, Indiana (19386); also two spiders from Wyandotte Cave, Indiana (19658).
- LEON, Dr. NICOLAS (Morelia, Mexico), presented a Mexican catechism—an old copy. 20119.
- LEWIS, WILLIS (Henderson, North Carolina), presented a specimen of a fluid extract of rattlesnake plantain, *Hieracium scabrum*, or *H. gronovii*, a reputed antidote for rattlesnake bite. 20555.
- LIENAN, D. B. (Joplin, Missouri), presented a specimen of olivine in limonite. 20711.
- LINCOLN, Dr. O. (U. S. Geological Survey), presented ten specimens of vanadinite from New Mexico. 20036.
- LINDBERG, J. J. E. (El Paso, Texas), presented two living specimens of Black Bear. 20143.
- LINEHAN, P., & Co. (Raleigh, North Carolina), presented a specimen of building-stone (19359); also a specimen of "black granite" (19404).
- LINTON, W. J. (New Haven, Connecticut), presented wood engravings by the donor; also a collection of wood engravings and photographs to illustrate the history of wood engraving. 20269.
- LIPSCOMB, A. A. (Washington, District of Columbia), presented two knives made of steel shoe-springs by convicts. 20628.
- LONG, W. B. (Steen's Creek, Rankin County, Mississippi), presented a plant supposed to be an antidote for rattlesnake bite. 19956.
- LOPOR, W. H. (Philadelphia, Pennsylvania), sent a wax impression of a coin for examination and report. 20487.
- LOVETT, EDWARD (Croydon, England), presented prehistoric stone implements, pottery, etc.; two paleolithic implements, from Madras, India, and fourteen from England; also neolithic specimens from England, Scotland, and Ireland, and fragments of Samian ware and flint flakes illustrating the manufacture of gem flints (20116); also sent in exchange prehistoric stone implements from the vicinity of Brandon, England, fifty-one specimens (20225), and a collection of ethnological objects (20116).

- LOWELL, JOHN A., & Co. (Boston, Massachusetts), presented an engraving, "The Bathers," by Schoff, after Hunt. 20299.
- LUCAS, F. A. (U. S. National Museum), gave in exchange a specimen of Burchell's Zebra, *Equus burchelli*, and a specimen of South American Tortoise, *Testudo tabulata*. 20099. (See also under Fish Commission, United States, 19588.)
- LUCE, ISRAEL (Sacramento, California), presented a specimen of white and a specimen of red marble. 20422.
- LUKANITSCH, M., Jr. (New York City), sent thirty-three wood engraver's implements. (Purchased.) 20619.
- LUSK, F. C. (Holley, New York), presented an abnormal pig. (Sent to the Army Medical Museum.) 20369.
- LUTHER, W. N. (Jefferson, North Carolina), sent minerals for examination and report. 20747.
- LYON, HALL & Co. (Baltimore, Maryland), sent a plant from China, also plants from Maryland, for examination and report. 20503.
- LYWOOD, W. (Gainesville, Virginia), presented eggs (containing embryos) of Spotted Sand-piper, *Actitis macularia*. 20766.
- MACDONALD, A. C., F. R. S. (Melbourne, Australia), through Col. J. M. Morgan, United States consul-general, presented pressed plants. 20375.
- MACE, JOSEPH (U. S. National Museum), presented a living specimen of Hare, *Lepus vulgaris*. 20344.
- MACHENHEIMER, G. L. (Forest Glen, Maryland), presented two living specimens of the Turkey Vulture (20200) and a living specimen of the Red-tailed Hawk (20400), also a specimen of Musk-rat, *Fiber zibethicus*, in the flesh (20245); and sent living specimens of the Mink, *Putorius vison* (20135, 20243), and of the Turkey Vulture (20103, 20130).
- MACLEAN, J. P. (Hamilton, Ohio), presented a prehistoric stone implement—a chipped celt—from Giant's Causeway, Ireland. 19994.
- MACRAE, DONALD (Wilmington, North Carolina), presented a "madstone," apparently an indurated and impure kaolin, supposed to have the virtue of extracting poison from wounds. 19705.
- MAGOUN, GEORGE C. (New York City), presented a specimen of Dolly-Varden Trout, *Salvelinus malma*, from Montana. 19783.
- MANIGAULT, Dr. G. E. (Charleston, South Carolina), sent in exchange a living specimen of Black Bear, *Ursus americanus*, swamp variety. 20059.
- MARKLAND, General A. H. (Washington, District of Columbia), lent a saddle used by General Grant in all the battles from Fort Henry, in February, 1862, to Petersburg, April 9, 1865; also pass (parchment) issued to General Markland and signed by General Grant. 19432.
- MARRON, AUGUSTUS (Washington, District of Columbia), presented a bird, *Ardea herodias*, from Eastern Branch, District of Columbia. 19647.
- MARSH, Prof. O. C. (See under Yale College Museum, 20448.)
- MARSHALL, GEORGE (Laurel, Maryland), presented a specimen of Butter-ball Duck, *Charitonetta albeola* (20173); four Warblers (19664); two birds in the flesh (19686); and four specimens of the Black Lamprey (20451).
- MARSHALL, HENRY (Laurel, Maryland), presented a specimen of Marsh Wren, *Cistothorus palustris*, from Alexandria, Virginia (19552); specimens of *Dendroica pennsylvanica*, *Agelaius phoeniceus* (albino), and *Seiurus aurocapillus* (19652); a specimen of Sharp-shinned Hawk, *Accipiter velox* (20056); and a specimen of Barred Owl, *Syrnium nebulosum* (20335).
- MARSHALL, Capt. JOHN (Gloucester, Massachusetts), presented parasite crustaceans, *Eggs psora*, from cod-fish. 19795.
- MARTIN, L. S. (Fayetteville, Arkansas), sent ores for examination and report. 19641.
- MARTIN, Capt. S. J. (Gloucester, Massachusetts), presented a pair of leather gloves and a piece of wood taken from the stomach of a cod (20486), and claw of Lobster, *Homarus americanus*, from the harbor of Gloucester, Massachusetts (20730).

- MASON, Prof. O. T. (U. S. National Museum), presented a prehistoric stone implement from Mount Vernon, Virginia (19998); a Chinese bank-note, collected by Leroy B. Willett (20040); a Jewish charm to be nailed on door (20465); and two lottery tickets of Dismal Swamp Canal Company, Alexandria, 1853 (20572).
(See also under John E. Merchant, 19367.)
- MASPERO, Prof. G. (Boulak Museum, Cairo, Egypt), presented five photographs of the mummy of Rameses II., the Pharaoh of the Exodus, taken during the process of unrolling at the Museum at Boulak by Professor Maspero. 20421.
- MATHER & PLATT (Salford Iron Works, Manchester, England), presented photographs of dynamo, passenger train, and goods train of the Bessbrook and Newry Electrical Tramway Company. 20531.
- MATHER, FRED (Cold Spring Harbor, New York), presented a specimen of Mink, *Putorius vison* (19767); a Mandarin Duck, *Aix galericulata*, from Paris, France (20132); eggs of Chinese Mandarin Duck and of Wood Duck (20204); and two specimens of the Mandarin Duck, *Aix galericulata* (20234, 20364).
- MATHERS, Capt. G. M. (Tampa, Florida), presented a Seminole tomahawk from near Bloomingdale, Florida. 20566.
- MATTHEWS, Dr. W., U. S. Army (Washington, District of Columbia), sent a silver pendant and a sinch from the Navajo Indians. 20077.
- MAURER, LOUIS (New York City), presented a drawing by the donor. 20275.
- MAYNARD, G. W. (New York City), presented copper ore from Vosresensk, Ufa, Russia. 19575.
- MAYNARD, WILLIAM D. (Hiko, Lincoln County, Nevada), presented ores. 19884.
- MCALLISTER, JOSEPH (Cold Spring, New York), sent insect for name. 19439.
- MICALPINE, J. B. (Jacksonville, Alabama), sent quartz containing a little pyrite, for examination and report. 19354.
- MCBEAN, ANNA C. (Tarrytown, New York), presented a Spokane cradle, war club, shell necklace, tobacco-pouch once the property of Red Cloud, Indian woman's hat, and money pocket, from Washington. 20048.
- MCCARTHY, GERALD (U. S. National Museum), presented plants from North Carolina (19729); and sent a collection of one hundred and twenty-five southern species, (20687).
- MCCARTHY, Col. W. T. (Hagerstown, Maryland), presented Silurian fossils, *Striatopora* sp. and *Beyrichia* sp. 19859.
- MCCORMICK, Dr. J. C. (Strawberry Plains, Tennessee), presented plants, including about twenty fragments of *Bovardia*, in exchange for publications of the Museum (19464); a collection of about 600 specimens of mound builders' implements from Jefferson County, Tennessee (19474); massive barite, and eighty specimens of Swift, *Chatura pelagica* (19545); and specimens of dried plants from Tennessee (19548); also sent in exchange human bones and fragments of pottery from McBee Mound, Jefferson County, Tennessee (19435).
- MCCORMICK, Mrs. SARAH C. (Paducah, Kentucky), presented shells, alcoholic and dry; calcite, quartz, etc.; birds' nests and birds' eggs; arrowheads and spear-heads, fifty-two specimens; a dried specimen of Long-nosed Gar, *Lepidosteus osseus*; bird skins; skeletons of man, deer, horse, and Gray Fox; and fossil corals. 19714.
- MCCRORY, J. A. (Miami, Florida), sent insect for name. 20530.
- MCDONALD, Mr. (through U. S. Geological Survey), presented coquimbite on quartz, from Coquimbo, Chili. 20337.
- MCDONALD, ANGUS (Washington, District of Columbia), presented Confederate States paper currency; foreign postage-stamps; coins; a copy of the Charleston (South Carolina) "Courier," December 13, 1860, and September 14, 1861; and "Association Tract No. 2" on State sovereignty, 1860. (20217, 20702.)
- MCDONALD, A. W. (Berryville, Virginia), sent minerals for examination and report. 20549.

- McELHONE, JAMES F. (Washington, District of Columbia), sent chert (19623), also quartz, zinc ore, and gypsum (19778), for examination and report.
- McFALL, Dr. D. M. (Mattoon, Illinois), presented a human foetus of five months, double. (Sent to the Army Medical Museum.) 19567.
- McGLUMPHY, Prof. G. W. (Greenfield, Missouri), presented a specimen of red clover, albino form. 20617.
- McGUIRE, JOHN (Bridgewater, Nova Scotia), sent galena for examination and report. 20373.
- McILWRAITH, T. (Cairnbrae, Hamilton, Ontario, Canada), sent bird skins in exchange. 20515.
- McLAUGHLIN, R. B. (Statesville, North Carolina), presented nest and five eggs of Brown-headed Nut-hatch, *Sitta pusilla*, from North Carolina. 19400.
- McLEAN, Dr. F. P. (U. S. Patent Office), sent specimens of iron, one specimen showing traces of aluminium, for examination and report. 20376, 20565.
- McLEAN, H. C. (Wilmington, Delaware), presented two ribbon badges, Fifteenth Annual Meeting of the Carriage Builders' National Association at Washington, 1887. 19717.
- McNIEL, J. A. (Panama, United States of Colombia), presented specimens of Chiriqui pottery. 19699.
- McRAE, Hon. THOMAS C. (Prescott, Arkansas), sent iron-stained sand, pyrite, mixture of pebbles, etc., for examination and report. 19602.
- MECHLIN, A. H. (Sunnyside, Kentucky), sent a specimen of galena for examination and report. 20227.
- MEDER, FERDINAND (New York City), sent an etching and two engravings. 20804.
- MEDFORD, HARVEY C. (Tupelo, Mississippi), presented sand and wood deposits from artesian wells at Tupelo. 20726.
- MEIGS, M. (Keokuk, Iowa), sent two swan skins. 20662.
(See also under A. Bridgman, jr., 20663.)
- MEIGS, General M. C., U. S. Army (Washington, District of Columbia), presented trade circulars. 20553.
- MELVILLE, JOHN (Portland, Oregon), presented a living specimen of Cross Fox, *Vulpes velox decussatus*. 19871.
- MERCER, R. W. (Cincinnati, Ohio), sent in exchange hematite celts, stone pipe, and a pierced discoidal stone (19625); also sent stone carvings and flint objects of unusual shapes, for examination and report. (20556).
- MERCHANT, JOHN E. (through O. T. Mason, U. S. National Museum), presented an iron hoe found under the roots of a large cedar tree on General Washington's estate. 19367.
- MERICA, F. M. (Garrett, Indiana), sent pyrite from Ohio for examination and report. 19500.
- MERRIAM, Dr. C. HART (Department of Agriculture), presented a Connecticut Warbler, *Oporornis agilis*, from Absecon Light, Atlantic City, New Jersey (19651); a Sharp-shinned Hawk, *Accipiter velox*, from Sandy Spring, Maryland (19781); a living specimen of Opossum (19864); a Raven, *Corvus corax sinuatus*, from Arizona (20152); nest and four eggs of *Geothlypis philadelphia*, and one egg of *Picoides arcticus* (20552); skin of a colt, *Equus caballus*, with abnormal hoofs, from Fort Benton, Montana (20630); wings of *Euthicia canora*, from Sombbrero Key, Florida, also a Cuban Finch new to the U. S. fauna (20729); and sent in exchange an albino Red-throated Loon (19422), and a Yellow-billed Tropic-bird, *Phaethon flavirostris*, from Bermuda (20749).
- MERRILL, GEORGE P. (U. S. National Museum), presented rocks from Arizona and California (19388); serpentine from Montville, New Jersey (19511); cumberlandite from Woonsocket, Rhode Island (19514); kersantite from New Jersey (19516); rocks from Cape Elizabeth, Maine (19546); rocks from Rockland,

MERRILL, GEORGE P.—Continued.

Maine, and calcite crystals, cleavage calcite, talc, garnet altering to chlorite, muscovite crystals in albite, and muscovite crystals (19553); boulders of glaucophane rock from California, purchased of W. L. Jones, Cloverdale, California (19775); peridotite, altered shale, and serpentine from Deer Isle, Maine (19581); rocks from Dover, Bellingham, and Needham, Massachusetts (19592); and diabase and vein formations from Maine (19594).

MERRILL, Dr. J. C., U. S. Army, presented birds' eggs: *Parus gambeli*, *Porzana carolina*, *Anas cyanoptera*, *Telmatodytes palustris*, *Gallinago delicta*, *Otocoris alpestris* — ?, *Junco hyemalis oregonus* (and nest), *Pyrrhuloxia ludoviciana* (and nest), *Contopus richardsoni* (and nest), and *Empidonax obscurus* (and nest) (19384); fishes, including *Chasmistes*, *Phoxinus phoxinus*, and *Ammocetes tridentatus*; and reptiles, including *Ambystoma macrodactylum*, *Bufo columbianus*, *Hyla regilla* and *Rana pretiosa*; land and fresh-water shells; a miscellaneous lot of insects; cray-fishes, and mammal skulls and skeletons, from Oregon (19748); Douglass Squirrel, *Sciurus hudsonius douglassi*; Bushy-tailed Wood-rat, *Neotoma cinerea*; White-footed Mouse, *Hesperomys leucopus*; Long-tailed Weasel, *Putorius longicauda*; Townsend's Spermophile, *Spermophilus richardsoni townsendi*; Day's Chipmunk; *Tamias lateralis*, and Townsend's Chipmunk, *Tamias asiaticus townsendii* (19752); birds' nests and birds' eggs: *Stellula calliope*, *Empidonax obscurus*, and *Geothlypis macgillivrayi* (19469).

MERRILL, L. H. (Agricultural Experiment Station, Orono, Maine), sent in exchange samples of soils. 20427.

METCHKE, OTTO (Tucson, Arizona), sent a specimen of arseniate of copper for examination and report. 20667.

METZEL, ROBERT F. (Washington, District of Columbia), deposited a German Bible, printed at Germantown in 1776. 20825.

MEYER, N. (Washington, District of Columbia), presented various campaign medals, also Grant badge (battles of Richmond, Vicksburgh, and Fort Donelson, 1865). 19930.

MEYERS, PETER (Stoutsville, Ohio), sent ore for examination and report. 20578.

MIDDLETON, J. (Four Mile Run, Virginia), presented a specimen of Black-nosed Dace, *Rhinichthys* sp., from the Potomac River. 19812.
(See also under Willie Taylor, 19420.)

MILITARY ACADEMY, UNITED STATES (West Point, New York), deposited a necklace made from human fingers by the Cheyenne Indians. Collected by Capt. John G. Bourke, U. S. Army. 19685.

MILLER, ALEXANDER McVEIGH (Alderson, West Virginia), presented a living Tortoise, *Cistudo carolina* (20613); also two living specimens of Striped Ground-squirrel, *Tamias striatus* (20713).

MILLER, CHARLES (Grand Rapids, Michigan), sent a specimen of gypsum for examination and report. 19596.

MILLER, CHARLES H. (New York City), presented drawings, etchings, and sketches by the donor. 20279.

MILLER, Capt. D. A. (Logan, Ohio), presented a badge worn on the occasion of the reunion of the Seventy-fifth Ohio Volunteers upon the battle-field of Gettysburgh, September 14, 1887. 19635.

MILLER, JOHN (through J. S. Diller, U. S. Geological Survey), presented massive pectolite, from near Mount Linn, California. 20366.

MILLER, STOWE & FREEMAN (Washington, District of Columbia), presented a Lion, *Felis leo* (19672); also a Monkey, *Macacus cynomolgus* (19683), for skeleton.

MILLER, THOMAS C. (Fairmont, West Virginia), presented medals awarded to West Virginia soldiers. 20795.

MILLS, ROBERT A. (Chuluota, Florida), presented a fine specimen of a beetle, *Acanthocinus nodosus*. 19487.

- MINER, S. (Toyah, Texas), sent mineral for examination and report. 19512.
- MITCHELL, GUY E. (Washington, District of Columbia), presented a nest of Large-billed Water Thrush, *Seiurus motacilla*. 20772.
- MONROE, R. W. (Romney, West Virginia), sent ores of copper, largely blue carbonate, for examination and report. 20258.
- MOORE, ALBERT (Philadelphia, Pennsylvania), sent a camera and part of a daguerreotype apparatus owned and used by Prof. S. F. B. Morse, and by him presented to the National Photographic Association, May 8, 1872. 20341.
- MOORE C. R. (Birdsnest, Virginia), presented pearls from an oyster from Hungar's Creek, Virginia. 20467.
- MOORE, GEORGE H. H. (Fish Commission United States), presented two living specimens of the Guinea Pig. 20140.
- MOOREHEAD, WARREN K. (Xenia, Ohio), presented prehistoric stone implements, twenty specimens, from Warren and Greene Counties, Ohio (20330), and a clay vessel from a mound in Greene County, Ohio (20689); also sent arrowheads for examination and report (20148).
- MORAN, Mrs. EMILY K. (Philadelphia, Pennsylvania), presented ten etchings by the donor. 20267.
- MORAN, Mrs. M. NIMMO (New York City), presented four etchings by the donor. 20295.
- MORAN, PETER (Philadelphia, Pennsylvania), presented thirty-five etchings by the donor. 20266.
- MORAN, THOMAS (New York City), presented six etchings by the donor. 20294.
- MORGAN, Col. J. M. (See under A. C. MacDonald, 20375.)
- MORGAN, Hon. J. T. (Selma, Alabama), sent ores, one of them containing magnetite, hematite, and spessartite, for examination and report. 19375, 19660.
- MORRIS, D. (See under Royal Gardens, Kew, 20488.)
- MORRIS, SCOTT (Spikenard, Oregon), sent for examination, a rock, bearing marks supposed by the sender to be those of a fossil plant. 20165.
- MORRISON, CHARLES F. (Fort Lewis, Colorado), presented birds' eggs from New Hampshire, Wyoming, and Colorado. 19958.
- MORRISON, JAMES H. (Lexington, Virginia), presented two specimens of pyrite. 20544.
- MORT, E. W. (Bristol, Tennessee), presented a specimen of ore. 19410.
- MORTON, HENRY. (See under Stevens Institute of Technology.)
- MOSMAN, JOHN (Helvetia, West Virginia), sent iron pyrite in a clay concretion, for examination and report. 19828.
- MOWAT, THOMAS (New Westminster, British Columbia), presented a "Rat-fish," *Chimara colliæi*, from Straits of Fuca and Georgia (20382); also sent a specimen of California Salmon, *Oncorhynchus chouicha*, for examination and report (19593).
- MOXLEY, L. (Washington, District of Columbia), deposited a living specimen of Grivet Monkey. 20168.
- MOYER, HENRY C. (Hilltown, Pennsylvania), sent a specimen of fossiliferous limestone, and ferruginous sandstone containing pseudomorphs of limonite after pyrite, for examination and report. 19837.
- MUELLER, BARON FERDINAND von (Melbourne, Australia), presented a valuable collection of Australian plants containing about five hundred specimens, all new to the herbarium. 20360.
- MÜLLER, Dr. AUGUST (Natural History Institute, Berlin, Germany), sent a collection of bird skins. (Purchased.) 19955.
- MULLINS, WILLIAM J. (Franklin, Pennsylvania), presented a collection of minerals containing twenty-eight specimens, from Pennsylvania. 20307.
- MUSÉE d'HISTOIRE NATURELLE (Paris, France), sent in exchange busts representing the various races of man. 19396.
- MUSEO NACIONAL DE COSTA RICA (San José, Costa Rica) lent bird skins for comparison and study at the request of the Curator of Birds. 19798.

- MUSEUM OF COMPARATIVE ZOOLOGY (Cambridge, Massachusetts), lent bird skins for comparison and study at the request of the Curator of Birds. 19731, 20074, 20172.
- MUSEUM OF FINE ARTS, School of Drawing and Painting (Boston, Massachusetts), presented twelve drawings by the pupils. 20298.
- MYERS, JOHN (Bracken, Texas), sent a tooth of fossil Meadow-Mouse, *Arvicola*, also tooth of a rodent, for examination and report. 19445.
- MYERS, W. H. (Washington, District of Columbia), presented two razors manufactured by the donor. 19635.
- NACHMAN, L. (Washington, District of Columbia), presented a medal of the Seymour and Blair Presidential campaign, 1868. 19379.
- NAGLE, HARRY (York Haven, Pennsylvania), presented a specimen of petrified wood. 19822.
- NATIONAL ACADEMY OF SCIENCES (through Prof. A. Hall, Naval Observatory, Washington, District of Columbia), presented a bronze medal struck by the Society of Astronomers, Vienna, in honor of Sir Theodor Oppolgel. 19831.
- NATIONAL MUSEUM OF BRAZIL, Rio de Janeiro, Brazil (through Orville A. Derby), sent in exchange meteorites, three of which contain iron. 20192.
- NEHRKORN, A. (Braunschweig, Germany), sent bird skins in exchange. 19980.
- NELSON, CHRISTIAN (Virginia City, Montana), sent ore for examination and report. 20505.
- NELSON, S. J., and JOSEPH SEWALLEN (Flippin, Marion County, Arkansas), sent limestone in calcite, for examination and report. 19442.
- NETHERLANDS GOVERNMENT (through Maj. J. W. Powell) presented a section of a meteoric stone containing iron. 19913.
- NEW ENGLAND MINING COMPANY (through J. F. Barse, New York City) presented four fragments of transparent beryl, and five cut beryl stones, from Berkshire Mines, Litchfield County, Connecticut. 19786.
- NEW JERSEY SUGAR OF MILK COMPANY (Hamburgh, New Jersey) presented two specimens of sugar of milk. 19626.
- NEWLON, Dr. W. S. (Oswego, Kansas), presented four specimens of fossil Nautilus (19896); flint chips and fragments of implements (20181); two flint cores, sixteen fragments, and a box of chips and flakes (20460); eleven *Unio* shells, thirteen arrowheads or knives, sixty flakes and three fragments of paint stone, from the site of an old Indian village, (20581).
- NEWMAN, G. R. J. (Washington, District of Columbia), sent micaceous hematite (19912) and a water-worn pebble (20351) for examination and report.
- NEWMAN, JAMES. (See under Frank Burns, 20690.)
- NICHOLSON, L. A. (Hillhurst, Washington), presented a chaetopod annelid belonging to the genus *Nephtys*, or an allied genus, from Puget Sound. 20785.
- NICOLL, J. C. (New York City), presented five etchings by the donor. 20283.
- NIEMEYER, Prof. JOHN H. (Yale College, New Haven, Connecticut), presented a water-color landscape. 20475.
- NISSLEY, J. R. (Ada, Ohio), presented prehistoric stone implements, some of them paleolithic, from Highland County, Ohio; Todd County, Kentucky, and Montgomery County, Tennessee. 20345.
- NOAH, JOHN M. (U. S. National Museum), presented Coleoptera: two specimens of the pupa of *Cyllene pictus* (19684); and a lithograph of the St. Paul Ice Palace, 1888 (20147).
- NOWELL, FREDERICK D. (North Platte, Nebraska), presented a living specimen of the Coyote. 20597.
- NULL, JAMES M. (McKenzie, Tennessee), presented a collection of two hundred and seventy-one prehistoric stone implements from Carroll County, Tennessee; thirty of these are paleolithic. 20545.
- NÜTTING, C. C. (State University of Iowa), sent fossil coal in exchange. 20528.

- NYE, WILLARD, Jr. (New Bedford, Massachusetts), presented two ducks from Wood's Holl, Massachusetts (19989); prehistoric stone implements and pottery—four scrapers, eight arrowheads, thirteen fragments of pottery—from the north bank of the Patuxent River, opposite Benedict, Maryland; also fragment of pierced tablet and twenty-five fragments of pottery, from Currituck Sound, North Carolina (20480); and ten specimens of prehistoric stone implements, paleolithic, from Martha's Vineyard, Massachusetts (20579).
- OBER, ANDREW K. (Beverly, Massachusetts), sent for examination and report arrowheads from Nova Scotia and from Nevada. 19968.
- O'CONNELL, E. DOROGHTERY (Washington, District of Columbia), sent decomposed mica for examination and report. 19459.
- OERLEIN, R. (New Orleans, Louisiana), presented a specimen of the manilla plant and sample of manilla hemp, from Honduras, Central America. 19835.
- OHM, FRED C. (Bureau of Ethnology, Washington, District of Columbia), presented a living specimen of Gray Squirrel, *Sciurus carolinensis carolinensis*. 19874.
- OLDS, FREDERICK A. (Raleigh, North Carolina), presented a collection of North Carolina State currency issued during the war of 1861-'65. 20025.
- OLMSTEAD, E. S. (Stepney Depot, Connecticut), presented topaz, tourmaline, scapolite, epidolite, native bismuth, fluorite, muscovite, and wolframite. 20014.
- O'MALLEY, Mr. (through U. S. Fish Commission), sent a larva of one of the Sialidae for examination and report. 20601.
- O'NEILL, JOHN A. (See under Treasury Department, Bureau of Engraving and Printing, 20325.)
- ORCUTT, C. R. (San Diego, California), sent shells, one hundred specimens of *Helix laevis*, in exchange. 20721.
- OSTRANDER, T. L. (Wells, New York), presented three living specimens of the Woodchuck. 20718.
- O'TOOLE, GEORGE P., H. P. Soule, and L. B. Washington (Washington, District of Columbia) presented a Hungarian fund certificate, dated New York, February 2, 1852, signed by L. Kossuth. 19929.
- OWEN, W. O., Jr. (Plattsburgh Barracks, New York), presented a specimen of Hellbender, *Menopoma allegheniense*. 19357.
- OWLSLEY, Dr. W. T. (Glasgow, Kentucky), presented a living specimen of Opossum (20466); and sent living specimens of the Gray Fox (20648, 20740) and a living Tortoise, *Cistudo carolina* (20649).
- PAEZ, DON RAMON (New York City), through E. G. Blackford presented a military cap and sword of the late General José Antonio Paez. 20388.
- PAGE, NELSON C. (Washington, District of Columbia), presented a fossil Crocodile, *Crocodylus* sp. 20154.
- PAGE, R. W. (Salem, Virginia), sent a specimen of rock; also cast of foot-print in limestone, for examination and report. 19536.
- PAGE, W. L. (Lynchburgh, Virginia), presented a natural formation slightly worked. 19402.
- PALMER, Dr. EDWARD (Washington, District of Columbia), deposited specimens of currency: Silver two-real, Spanish Mexican, 1820; copper clacka, Mexican; and pasteboard money, value $12\frac{1}{2}$ cents, southern California (20170). Also sent a valuable collection of Mexican plants, comprising seven hundred and sixty-eight specimens. (This collection has been worked up by Dr. Sereno Watson, of Cambridge, Massachusetts, and the results published in "The Proceedings of the American Academy of Arts and Sciences," vol. XXIV, 1889, pp. 36-87.) Forty-eight specimens of materia medica, from California; a collection of one hundred and forty-seven articles, funeral equipments, from a burial cave near Los Angeles Bay, 200 miles northwest from Guaymas, Lower California; ethnological objects: drum, rattles, fruit pickers, digging-sticks, water-jar, coloring materials, and other objects, from the Yaqui Indians, Sonora, Mexico; twenty-

PALMER, DR. EDWARD—Continued.

seven specimens of rocks from Lower California and Mexico; eggs of *Sula brewsteri* and of *S. gossi*, from California; bryozoa and worm tubes, from Guaymas, Sonora, Mexico (also specimens of Indian foods from California, 20608).

PALMER, JOSEPH (U. S. National Museum), presented living specimens of the southern Gray Squirrel, from Maryland (20052); and a living specimen of Crow, *Corvus americanus* (20343).

PALMER, J. S. (Cleveland, Ohio), sent beads for examination and report. 19475.

PALMER, WILLIAM (U. S. National Museum), presented a fragment of pottery found in Alexandria County, Virginia (19639); a specimen of Kirtland's Warbler, *Dendroica kirtlandi* (19643); four specimens of the Fly-catcher, *Empidonax* sp., from Escanaba, Michigan (19763); a skin of *Seiurus noveboracensis notabilis* (19676); Maryland Yellow-throat, *Geothlypis trichas*, from Point Lookout, Maryland (20607); and a specimen of *Tropidonotus sipedon* (20763).

(See also under Fish Commission, United States, 19588.)

PARK, E. H. (Millbury, Massachusetts), sent a specimen of the Harlequin Snake, *Elaps fulvius fulvius*, from Florida, for examination and report. 20316.

PARKE, C. A. (Wolverton, England), presented tracings and interior views of sleeping-carriages used on the London and Northwestern Railway. 20534.

PARKE, DAVIS & Co. (Detroit, Michigan), presented five lithographs of certain tablets from the Easter Islands (19610), and sent in exchange ethnological objects from Polynesia (19712).

PARKE, EDMUND B. (Brooklyn, New York), presented twenty-five coins of foreign countries. 20211.

PARRISH, STEPHEN (Philadelphia, Pennsylvania), presented etchings and dry points by the donor. 20270.

PARSONS, CHARLES (New York City), presented a wood-cut by Dr. Alexander Anderson. 20300.

PATRICK, L. S. (Marinette, Wisconsin), presented a bow and three arrows made by John Kagnetosh. 20350.

PAVY, MRS. LILLIE MAY (New York City), presented a sketch of an Eskimo village, also a surgeon's lancet, used by Dr. Pavy on the Greely Arctic Expedition (20793); and deposited a portrait of Dr. Pavy (20614).

PAYNE, DR. ALVAN S. (Markham, Virginia), presented arrowheads, ores, and hard and soft marbles (19669).

PEABODY ACADEMY OF SCIENCE (Salem, Massachusetts) presented prehistoric stone implements from Essex County, Massachusetts, including seven paleolithic specimens. 20159.

PEALE, DR. A. C. (U. S. Geological Survey), presented thirty-three specimens of wood opal from Gallatin County, Montana, and one specimen of rose quartz from Montana (19919); also a concretion from the Yellowstone River, near Billings, Montana (20195).

PEARCE, RICHARD (Denver, Colorado), presented meteoric iron from Albuquerque, New Mexico. 20167.

PECK, F. H. (U. S. National Museum), presented paper currency of the State of Maryland, April 10, 1774, denomination one dollar. 20041.

PEFFER, JAMES H. (Westport, Connecticut), presented a one-cent pattern piece, Feuchtwanger composition, 1837 (19648); also an old iron ball and chain, and an iron knuckle (19720).

PENDLETON, J. C. (Quincy, California), sent a specimen of asbestos for examination and report. 20425.

PENFIELD, S. L. (U. S. Geological Survey), presented twenty-six specimens of minerals, including pink tremolite, green phlogopite, albite crystals, brown tourmaline in calcite, oligoclase crystals, oligoclase and pyroxene, zircon crystals, calcite, and crystallized graphite. 20415.

- PENNSYLVANIA RAILROAD COMPANY presented lithographed plans of standard turn-outs, cross-overs, and of standard road-bed (20435) (through J. F. Richards); sections of standard rails, locks, nuts, bolts, etc. (20490); medallion of John Stevens, from paddle-box of steamboat destroyed by fire at Camden, New Jersey (20494) (through F. Walcott Jackson); photographs of type of inspection car used on Pennsylvania Railroad (20561) (through Thomas N. Ely); iron rail and spikes used on the Camden and Amboy Railroad in 1849 (20583) (through Robert P. Snowden); locomotive lanterns and sections of rails used on the Camden and Amboy Railroad (20728) (through Robert P. Snowden, Samuel S. Roberts, and Frederick I. Stutts); model of railroad track, Pennsylvania Railroad standard, 1884 (20768) (through J. F. Richards); and sent a model of a canal-boat (20824).
- PERKINS, Prof. G. H. (Museum of the University of Vermont), presented a collection of prehistoric stone implements, and also deposited prehistoric stone implements. 20554, 20734.
- PERRY, E. A. (Hartford, Connecticut), presented a ribbon badge of the "Putnam Phalanx," of Hartford. 19830.
- PERRY, N. H. (South Paris, Maine), sent in exchange six specimens of petalite with spodumene, from Peru, Maine (20215), and Iceland spar, andalusite, and phyr-rhotite crystals in quartz (20338).
- PETTIT & DRIPPS (Washington, District of Columbia) presented a living specimen of Porcupine, *Erithizon dorsatus*, from Virginia. 20753.
- PETTIT, ROBERT E. (Altoona, Pennsylvania), presented a portage railroad frog. 19443.
- PHILLIPS, BARNET (Brooklyn, New York), presented an opium pipe, also a pipe made of stone. 20567.
- PHOENIX GLASS COMPANY (Pittsburgh, Pennsylvania) presented glassware. 20500.
- PHOTOGRAVURE COMPANY (New York City) presented proofs illustrating the photo-gravure process. 20324.
- PIERCE, H. D. (Hypoluxo, Florida), sent a Bat-fish, *Malthe vespertilio*, for examination and report. 20568.
- PIKE, A. F., MANUFACTURING COMPANY (Pike Station, New Hampshire), presented specimens of Washita whetstones. 19364.
- PIPER, Miss TILLIE (U. S. National Museum), presented a Bat, *Vesperugo scrotinus*. 19504.
- POLING, O. C. (Quincy, Illinois), presented a Little Yellow Rail, *Porzana noveboracensis*. 20092.
- POLLOCK, GEORGE F. (Washington, District of Columbia), sent a living specimen of Opossum (20636), and four living specimens of the Gray Squirrel (20611).
- POWELL, Maj. J.W. (See under Interior, Department of the, U. S. Geological Survey, also under Bureau of Ethnology, and under Government of the Netherlands.)
- PRANG, L. & CO. (Roxbury, Massachusetts) presented two hundred and eighty-four lithographs to illustrate the history of lithography, and one aquatint (20593); chromo-lithographs by Storch and Kramer and F. Gilner (20610), and nine chromo-lithographs by the donors (20640).
- PRANG, LOUIS (Roxbury, Massachusetts), presented four wood engravings and one drawing. 20286.
- PRATT, W. H., and JOHN VANCE (Eureka, California) presented a red-wood plank. 20288.
- PRESTON, A. B. (Hartford, Connecticut), presented a badge of the "Putnam Phalanx," of Hartford. 19679.
- PRESTON, J. W. (Baxter, Indiana), presented two eggs of *Buteo borealis*. 20585.
- PRICE, THOMAS (San Francisco, California), presented wulfenite and descloizite (19617), and vanadinite, descloizite, and cerussite and pyrolusite (20606).

- PRICE, T. S. (Marysville, California), presented a specimen of the wood of *California manzanita*. 19446.
- PRICE, W. W. (Riverside, California), presented a specimen of the Rusty Song Sparrow, *Melospiza fasciata guttata* (20306), also sent birds' skins for examination and report (19840, 20306, 20743).
- PRINGLE, C. G. (Charlotte, Vermont), presented a collection of Mexican plants, including many species new to science, which have been named by Watson, Vasey, Britton, and others. 20430.
- PROUDFIT, S. V. (Washington, District of Columbia), presented prehistoric stone implements: Chips, flakes, paleolithic implements, scrapers, notched implements, rude axes, a grooved axe, one hundred and thirty arrowheads, and one unstemmed spear-head, from the District of Columbia. 20003, 20358.
- PURNELL, J. H. (Opelika, Alabama), presented Lepidoptera, and cases of Bagworm, *Thyridopteryx ephemeraformis*. 20457.
- QUACKENBOS, DR. JOHN D. (Columbia College, New York City), presented a new species of Trout, *Salvelinus aureolus*, three specimens, from Sunapee Lake, New Hampshire. (Described in "Proceedings of the U. S. National Museum," vol. x, 1887, page 628.) 19853.
- QUEEN OF HAWAII, presented through the Department of State a canoe similar to those in use by the natives of Hawaii. 20085.
- QUICKSILVER MINING COMPANY (San Francisco, California) presented a glass model representing the New Almaden mine and its underground workings; also photographs of its machinery, etc. 20762.
- QUINN, W. M. (keeper, Cape San Blas light station, Apalachicola, Florida), presented twelve specimens of the young of the Atlantic Hawk's-bill Turtle, *Eretmochelys imbricata*, in the flesh. 21002.
- QUINTIN, ANDREW (Trenton, New Jersey), presented a lithograph of the iron steamboat *R. S. Stockton*. 20313.
- RABY, ST. GEORGE R. (Mount Pleasant, District of Columbia), presented a one-cent piece United States, 1793; a twenty-reis, Brazil, 1869; and a ten-cent piece, Hayti, 1846; also three sutler's checks, U. S. Army (19972); a copper twenty-five-cent piece, a brass fifty-cent piece, and sutler's checks (20194).
- RABY, ST. GEORGE R., JR. (Mount Pleasant, District of Columbia), presented Confederate States paper currency: One dollar, 1862; five dollars, 1863; and one hundred dollars, 1863, Louisiana. 19973.
- RAGSDALE, G. H. (Gainesville, Texas), sent feathers of a duck (20539), cretaceous fossils, fine siliceous sandstone, calcareous sandstone, impure limestone, and argillaceous limestone (19990), for examination and report.
- RAILWAY GAZETTE (New York City) sent forty numbers of the "Railway Gazette," containing plates. 20495.
- RANDALL, A. FRANK (Los Angeles, California), presented unmounted photographs of Apache Indians. 20263.
- RANSOM, WILLIAM (Fairfield, Hitchin, Hertfordshire, England), presented archaeological objects: Eight specimens of paleolithic implements found about thirteen feet below the surface in yellow clay near Hitchin, Hertfordshire; eight specimens of neolithic implements, from the chalk-downs on the south coast of England; one neolith from Norway; two flakes from France; seven pieces of Saunian ware dug from the earth about twelve feet below the surface in the city of London, Roman deposit; three Roman styles, exhumed in London from a depth of two feet. 20668.
- RATHBUN, RICHARD. (See under Fish Commission, United States, 20000.)
- RAU, DR. CHARLES (Smithsonian Institution), bequeathed a collection of prehistoric implements, utensils, and ornaments: Four hundred and seventy-four European specimens, thirteen hundred and sixty-seven American specimens, and five hundred and eighty-seven Indian specimens; also coins in silver and copper, ancient and modern, European and American. 19931.

- RAVENÉ, GUSTAVE (U. S. National Museum), presented two brass cartridges, English Government type (19645); also a collection of foreign postage-stamps, containing ninety-seven specimens (19663).
- RAY, ALFRED (Forest Glen, Maryland), presented a living specimen of the Screech Owl, *Megascops asio*. 20654.
- READWIN, T. A. (London, England), presented a specimen of gold in quartz from Wales. 19743.
- REARDON, WILLIAM (Washington, District of Columbia), presented a section of Georgia pine from Galt's grain elevator (Washington), showing the action of grain in eroding wood. 20634.
- REED, JOHN W. (Gaithersburgh, Maryland), presented a living specimen of the Sparrow Hawk. 20775.
- REYNOLDS, A. D. (Bristol, Tennessee), sent quartz, an obscure rock mixture, and quartz containing pyrite (19742), and galena, micaceous hematite, decomposed granite, etc. (19583), for examination and report.
- REYNOLDS, E. R. (Washington, District of Columbia), presented a collection of two hundred and fifty-nine prehistoric stone implements from various localities in the District of Columbia. 20497.
- REYNOLDS, GEORGE D. (St. Louis, Missouri), presented two silver medals, Twenty-first National Encampment, G. A. R., September, 1837, and bronze medal worn by members of the subcommittee. 19688.
- RHODES, G. W. (See under Chicago, Burlington and Quincy Railroad, 20810.)
- RICE, MOSES (Washington, District of Columbia), presented a specimen of the Red-tailed Hawk, *Buteo borealis*, from Maryland. 19799.
- RICE, Prof. WILLIAM NORTH (Wesleyan University, Middletown, Connecticut), sent minerals for examination and report. 20100.
- RICE, Hon. W. T. (United States consul, Horgen, Switzerland), presented coins, in copper, silver, and gold, of Ceylon, Europe, United States, and South America (19468); also six specimens of copper coins made by the English Government for Ceylon (19632).
- RICH, SHEBNACH (Salem, Massachusetts), presented a "Kyal" lamp, an old "fat" lamp used to hang in the fire. 20563.
- RICHARDS, CHARLES N. (United States Senate), sent a sample of soil for examination and report. 19603.
- RICHARDS, J. F. (See under Pennsylvania Railroad, 20435, 20768.)
- RICHARDSON, C. B. (Chester, Virginia), sent a sandstone pebble for examination and report. 20346.
- RICHARDSON, W. G. (United States Navy), sent bird skins for examination and report. 20656.
- RICHMOND, A. G. (Canajoharie, New York), presented prehistoric stone implements, pottery, shells, bones, and mammal teeth, from the Mohawk Valley, three hundred and ninety-six specimens in all. 20784.
- RICHMOND, CHARLES W. (U. S. Geological Survey), presented birds' nests: *Sialia sialis*, *Myiarchus crinitus*, *Passerina cyanea*, *Vireo flavifrons*, and *Troglodytes ædon* (19394), nest of *Helminthophila chrysoptera* (19736), and a collection of about nine hundred and fifty birds' eggs, comprising seventy-six species, obtained mostly in the District of Columbia, by C. W. Richmond, Melville Thompson, and Hugh M. Smith (19891); also sent in exchange a specimen of *Anhinga anhinga*, from Florida, (19943), and a specimen of *Loxia americana minor*, from the District of Columbia (20310).
- RICKARDS, T. M. (Candler, Florida), presented vertebræ and a fossil tooth. 20577.
- RIDLEY, C. W. (See under Charles Hall, 19549.)
- RIDDLE, J. W. (Eagle Pass, Texas), presented a living Jaguar, from Texas. 20076.
- RIDGWAY, JOSEPH H. (Olney, Illinois), presented a specimen of the Purple Finch, *Carpodacus purpureus*. 20229.

- RIDGWAY, ROBERT (U. S. National Museum), presented four birds (19406); specimens of the Maryland Yellow-throat, *Geothlypis trichas*; Summer Tanager, *Piranga rubra*; Chewink, *Pipilo erythrophthalmus*, and Long-billed Marsh Wren, *Cistothorus palustris* (19503); bird skins, four specimens; and nests of *Passerina cyanea*, *Vireo olivaceus*, and *Poliophtila cerulea* (19551), and birds' nests, and birds, four specimens, from Gainesville, Virginia (19559); also deposited photographs of the Gustoso Indians of the Rio Frio District of Costa Rica (19370).
- RIKER, C. B. (New York City), presented bird skins, from the region of the Lower Amazon (19768); and sent bird skins for examination and report (19523, 19600).
- RIKER, GEORGE A. (Alexandria, Virginia), presented two living specimens of the Barred Owl. 20609.
- RILEY, Prof. C. V. (Department of Agriculture), presented a specimen of manganese-oxide dendrite from Albuquerque, New Mexico. 20384.
- RINKER, JOSIAH (Gainesborough, Virginia), sent a specimen of carbonaceous shale with veins of white calcite and coatings of iron pyrites, for examination and report. 20542.
- RITTENHOUSE, N. M. (Baltimore, Maryland), presented a specimen of the first paper manufactured in North America. Made by Clase Rittenhouse in Roxborough township, county of Philadelphia, Pennsylvania, in 1691. 20484.
- RITTER, S. (Brooklyn, New York), presented a cap and cape worn by the "Wide Awakes" in the Presidential campaign of 1860. 19856.
- ROBERTS, SAMUEL L. (See under Pennsylvania Railroad, 20728.)
- ROBERTS, W. T. (Washington, District of Columbia), sent in exchange six specimens, six species, of bird skins from Guayaquil, Ecuador. 19681.
- ROBESON, Mrs. GEORGE M. (Washington, District of Columbia), deposited a specimen of the Snowy Owl, *Nyctea nyctea*; one pair each of the antlers of *Alces machlis*, *Cariacus columbianus*, and *Ovis montana*; two Japanese bronze vases; two large china vases; bronze figure of Buddha; medallion of Washington, Lincoln, and Grant; bust, "The Nation's Ward;" and a small model of the Venus of Milo (20491); also arrows and arrowheads from Sitka, Alaska (20537).
- ROBINSON, CONWAY, Jr. (Soldiers' Home, District of Columbia), presented a living specimen of the Hog-nosed Snake, *Heterodon platyrhinus*. 19489.
- ROBINSON, R. L. (Dodd City, Kansas), (see under U. S. Geological Survey.)
- ROBINSON, Miss VIOLET (Washington, District of Columbia), deposited a silver coin, one franc, France, 1868; and a copper coin, five lepta of Greece, 1869. 20385.
- RODMAN, Dr. JAMES (Hopkinsville, Kentucky), presented a dried plant, *Pancratium* sp? 19543.
- ROMEYN, Capt. HENRY, U. S. Army (Fort Keogh, Montana), presented a living specimen of the Mountain Lion, *Felis concolor*. 20535.
- ROTHFUCHS, C. F. (Washington, District of Columbia), presented lithographs representing coats-of-arms, portraits of all living rulers, and merchant flags of all nations. 20221.
- ROULET, F. (Newark Valley, New York), presented sixteen specimens of prehistoric stone implements, including fourteen leaf-shaped implements (type Solutrian); one spear-head; and a water-worn pebble with chipped cutting edge. 20688.
- ROUSE, C. W. (Kingston, New Mexico), sent minerals for examination and report. 19443.
- ROVIROSA, JOSÉ N. (San Juan Batiste, Mexico), presented specimens of bats, *Mormops megalophylla* and *Vesperugo serotinus fuscus*?; an interesting collection of plants; a collection of bird skins (20463), and two sets of Mexican plants (20691, 20756).
- ROW, A. M. (Clearfield, Pennsylvania), sent insect for name. 20741.
- ROWLAND, THOMAS (New York City), sent bird skins. 20794.
- ROYAL GARDENS (Kew, England), through D. Morris, Assistant Director, presented a collection of one hundred and ninety specimens of vegetable economic products. 20488.

- ROYLE, JOHN, & SONS (Patterson, New Jersey), presented two photographs of routing machine. 20625.
- RUBY, CHARLES. (See under Dr. R. W. Shufeldt, U. S. Army, 19776.)
- RUGGLES, CHARLES (Brouson, Michigan), presented three paleolithic prehistoric stone implements (20208), and a hammer-stone and three paleolithic implements. 20420.
- RUGGLES, DANIEL (Fredericksburgh, Virginia), presented specimens of percussion caps made of paper and leather and charged with fulminate of mercury, invented for Confederate troops, department of Fredericksburgh, May, 1861, by Brig. Gen. Daniel Ruggles, Confederate States Army, commanding department. 20381.
- RUSH, Dr. W. H., U. S. Navy (Philadelphia, Pennsylvania), lent shells from West Indies and the southeast coast of the United States, for comparison and study, at the request of the Curator of Mollusks. 19518.
- RUSSELL, CHARLES W. (Department of Justice), presented two uniform coats worn by Col. R. G. Mosby, of the Confederate States army, during the war of 1861-'65. 20063.
- RUSSELL, I. C. (U. S. Geological Survey), presented a collection of about thirty species of fossil plants, two of which are new to science, from Alabama (see "Proc. U. S. National Museum," vol. XI, 1888, pp. 83-87) (20262), and a map of Lake Lahonton, Nevada (20570).
- RUSSELL & RICHARDSON (Boston, Massachusetts), presented twenty specimens of wood engraving. 20624.
- RUTHERFORD, HORACE (Trenton, Kentucky), presented a spider, species undeterminable. 19585.
- RYAN, BLAKE (Washington, District of Columbia), presented a uniform coat of Company A, Ninth Kentucky Infantry, Confederate States army, 1861. 20045.
- RYNERSON, J. H. (Las Cruces, New Mexico), sent a specimen of rock containing supposed foot tracks, for examination and report. 19665.
- SALOMON, FRED (Salt Lake City, Utah), sent hornblende containing calcite, for examination and report. 20349.
- SALVIN, O. (See under T. D. Godman, 20007.)
- SAMSON, Mrs. G. C. (Washington, District of Columbia), presented silver coins of India. 19883.
- SANDOS, W. A. (Opelousas, Louisiana), presented larvæ of *Empretia stimula* (19671) and a crystal of *Papilio crespontes* (19962) from Opelousas.
- SARONY, NAPOLEON (New York City), presented a lithograph by the donor. 20289.
- SAWTELL, GILMAN (Alderdice, Montana), presented three specimens of the Great Lake Trout, *Salvelinus namaycush*, from Henry Lake, Idaho. 19803.
- SAWYER, C. M. (Mechanic Falls, Maine), presented prehistoric stone implements from Lake Auburn, Androscoggin County, Maine (19946); also prehistoric stone implements from other parts of Maine (20046), and sent others for examination and report.
- SAWYER, J. G. (Washington, District of Columbia), sent limestone conglomerate decomposed rock, and a water-worn pebble, for examination and report. 19922.
- SCHMID, LOUIS, & SONS (Washington, District of Columbia), presented a parrot, *Amazona leucocephala*, from Cuba (19421); a Yellow-shouldered Parrot, *Amazona orochroptera* (19576); three specimens of birds in the flesh (20118); two living Ferrets (20141); and living specimens of Gambel's Partridge, from Arizona (20126).
- SCHMID, LOUIS A., & SONS (Washington, District of Columbia) presented two living specimens of the Hare, *Lepus vulgaris*. 20342.
- SCHNECK, J. (Mount Carmel, Illinois), presented a Great Horned Owl in the flesh (20051), also a living specimen of the same (20650).
- SCHNEIDER, MARTIN (Washington, District of Columbia), deposited a stuffed Eel. 20081.

- SCHOENBORN, H. F. (Washington, District of Columbia), presented a collection of Lepidoptera: *Callimorpha suffusa*, from Virginia; *C. contigua*, from the District of Columbia; *C. militaris*, from Ohio; and *C. fulvicosta*. Some of these are new to the collections. 19565.
- SCHOFF, STEPHEN ALONZO (Newtonville, Massachusetts), presented an engraving by the donor. 20280.
- SCHRAUBSTADTER, CARL (St. Louis, Missouri) presented plates, tools, etc., showing the use of the donor's Star engraving plates. 20396.
- SCHREIBER, W. A. H. (Webster, North Carolina), presented specimens of peridotite (19722), and sent manganiferous limonite (19817), limonite and mica schist (19824), and chromite (20011), for examination and report.
- SCHUETTE, J. H. (Green Bay, Wisconsin), sent in exchange German mosses and lichens (19637), and cryptogamous and phænogamous plants from Wisconsin (20419).
- SCHWARZ, E. A. (Washington, District of Columbia), presented specimens of Orthoptera and Neuroptera, also a specimen of the very rare *Oligotoma hubbardi* Hazen from Florida (19535); and sent in exchange Coleoptera: *Lachnosterna clypeata*, *L. latifrons*, and *L. amula* from Florida, new to the collections (20639).
- SCHWARZ, G. A. (Philadelphia, Pennsylvania), sent a miniature travean and horses for model of canal-boat. 20819.
- SCOTT, ALEXANDER (U. S. Patent Office), presented ancient Greek coins, one of city of Pauticapeum, and one of city of Sinope, B. C. 350. 20216.
- SCOTT, HAMILTON (Maness, Scott County, Virginia), sent a specimen of impure iron ore for examination and report. 19571.
- SCOTT, SAMUEL (Rapid City, South Dakota), presented tin and other ores; and minerals: cassiterite, muscovite, albite, spodumene, tripolite, garnet, rose quartz, tautalite, and green, blue, and black tourmaline, from the Black Hills (20498); and sent ilmenite and crystals in feldspar for examination and report (19843).
- SCOTT, THOMAS W. (Richmond, Virginia), deposited an electoral ticket of the State of Virginia for President and Vice-President of the Confederate States, November 6, 1861. 20735.
- SECKLER, W. S. (Trinity, Texas), sent a specimen of a mineral for examination and report. 19562.
- SEEBOHM, HENRY (London, England), presented six specimens of Sand-pipers (19448); deposited a type of *Pitta oreas* (19448); and sent bird skins from various localities in exchange (20327).
- SEIBERT, S. R. (Washington, District of Columbia), deposited two camera boxes. 20781.
- SELLERS, JOHN (New York City), presented engravers' and etchers' tools and materials. 20661.
- SELLNER, J. J. (Camp Springs, Prince George's County, Maryland), presented a living specimen of Cooper's Hawk, *Buteo cooperi*, from Maryland (20223), and a specimen of Rabbit, *Lepus sylvaticus*, in the flesh (20742).
- SENNETT, GEORGE B. (American Museum of Natural History, New York City), presented bird skins: *Colymbus dominicus*, *Phalacrocorax mexicanus*, *Dendrocygna autumnalis*, *Colinus virginianus texanus*, *Callipepla squamata castanogastris*, *Ortalis vetula macalli*, *Columba flavirostris*, *Engyptila albifrons*, *Parabuteo unicinatus harrisi*, *Buteo albicaudatus*, *Polyborus cheriway*, *Chordeiles texensis*, *Dryobates scalaris*, *Myiarchus mexicanus*, *Otocoris alpestris giraudi*, *Corvus cryptoleucus*, *Quiscalus macrourus*, *Xanthoura luxuosa*, *Icterus cucullatus*, *I. audubonii*, *I. spurius*, *Pyrrhuloxia sinuata*, *Peucaea cassini*, *Spizella pusilla*, *Guiraca caerulea*, *Passerina versicolor*, *Embernagra rufivirgata*, *Lanius ludovicianus excubitorides*, *Harporhynchus longirostris*, *H. curvirostris*, *Campylorhynchus brunneicapillus*, *Thryothorus bewickii bairdi*, *Polioptila plumbea*, and *Auriparus flaviceps* (19739); and on several occasions lent bird skins, for comparison and study, at the request of the Curator of Birds (19356, 19846, 19934).

- SESSFORD, J. S. (U. S. National Museum), presented a fac-simile engraving of the original Declaration of Independence. 20207.
- SEWALLEN, JOSEPH. (See under S. J. Nelson, 19442.)
- SEWELL, Dr. J. A. (Rockwood, Tennessee), sent a specimen of Horn-snake, *Ophiosaurus ventralis*, for examination and report. 19614.
- SHAH OF PERSIA (through Department of State) sent a specimen of native gold-bearing quartz for examination and report. 20378.
- SHARP, GEORGE B. (New York City), presented plates of pure copper, copper alloy, steel, and zinc. 20620.
- SHARPLESS, A. (West Chester, Pennsylvania), presented prehistoric stone implements, two paleolithic, one leaf-shaped (20158), one leaf-shaped (20429), and twenty-two specimens, ten of them paleolithic (20603).
- SHARPLESS, S. P. (Boston, Massachusetts), presented an exceedingly valuable collection containing more than eleven hundred specimens of North American woods, embracing over four hundred species, collected by the agents of the Tenth Census and used by Mr. C. S. Sargent in connection with the preparation of vol. IX of the report of the Tenth Census (20115); also howlite from Nova Scotia and massive pyrite from Newfoundland (20137), and photomicrographs of all species of North American pines, made by the donor (20149).
- SHELDON, W. H. (Climax, Michigan), sent in exchange a collection of prehistoric stone implements, consisting of three rude arrowheads, one small spear-head, two large spear-heads, one rude wedge-shaped implement, one small implement of banded slate, one large implement of banded slate, and a fragment of a drilled ceremonial object, from Kalamazoo County, Michigan. 20807.
- SHELLACK, Dr. E. H. (Allen, Kansas), sent an object supposed to be a "fossil egg" for examination and report. 20678.
- SHEPARD, CHARLES U. (Charleston, South Carolina), presented books from the library of Charles U. Shepard, Sr., deceased (20020), and deposited framed photographs of meteorites and a framed portrait engraving of the late Prof. C. U. Shepard (through Cutler's Art Store, New Haven, Connecticut), (20026).
- SHEPARD, JAMES (New Britain, Connecticut), presented a specimen of supposed volcanic rock from Meriden, Connecticut. 19711.
- SHICK, CHARLES S. (Sea Isle City, New Jersey), sent a nest and four eggs of *Ammodramus maritimus* for examination and report. 20755.
- SHIELDS, CHARLES O. (Grange, Colorado), sent specimens of the Blistering Beetle, *Meloe sublavus*, for examination and report. 19444.
- SHIRLAW, WALTER (New York City), presented three drawings by the donor. 20287.
- SHOEMAKER, ERNEST (Washington, District of Columbia), presented a collection of prehistoric stone implements, including nine leaf-shaped implements, four notched implements, and twenty-two rude implements of the paleolithic type. 20175.
- SHOLL, H. C. (Marble Hill, Massachusetts), through Hon. J. P. Walker, sent a specimen of limonite for examination and report. 20246.
- SHREIBER, W. A. H. (Webster, North Carolina), sent in exchange chromite and other ores. 19455.
- SHRIVER, HOWARD (Wytheville, Virginia), presented prehistoric stone implements—four arrowheads. 20182.
- SHUFELDT, Dr. R. W., U. S. Army (Fort Wingate, New Mexico), presented mammals: *Hesperomys truei*, *Cricetopus flavus*, and *Thomomys talpoides umbrinus* (19401); a specimen of dressed buckskin, bone used by the tanner in dressing the skin, and seven photographs showing entire process of tanning by the Navajo Indians (19540); dendritic markings from Fort Selden, New Mexico (19615); crania and sterna of birds (see "Proc. U. S. National Museum," vol. X, 1887, p. 376) (19719); a specimen of *Ardea virescens*, from Arizona (obtained by Charles Ruby, U. S. Army) (19776); a specimen of the Skunk, *Mephitis mephitis*, from Fort Wingate (19802); and a skeleton of the Raven, *Corvus corax sinuatus* (20595).

- SHUTT, GEORGE W. (U. S. Geological Survey), presented four specimens of the Banded Rattlesnake, *Crotalus horridus* (19490), and a living specimen of Eagle, from Virginia (19816).
- SICKLES, F. E. (Kansas City, Missouri), presented the first steam steering-engine practically applied to a vessel. 20574.
- SIEBERT, S. R. (Washington, District of Columbia), presented daguerreotype plates, buff stick, bromine box, daguerreotype sensitizing box, etc. 20769.
- SIEMASCHK, J. VON (St. Petersburg, Russia), sent in exchange two fragments of meteoric stone from Russia. 19988.
- SIMMONS, GEORGE C. (New York City), presented a Flying-squirrel, *Sciuropterus volucella albino*. 19509.
- SIMPSON, CHARLES T. (Ogallala, Nebraska), presented land and fresh-water shells from Indian Territory (20722); also lent a specimen of *Natica fordiana* Simps., from Saratoga Bay, Florida, for comparison and study, at the request of the Curator of Mollusks (20073).
- SINGLEY, J. A. (Giddings, Lee County, Texas), presented six species of fresh-water shells (19694); also lent land and fresh-water shells from the vicinity of Austin, Texas, for comparison and study, at the request of the Curator of Mollusks (19790).
- SISK, Dr. C. T. (Shady Grove, Jefferson County, Tennessee), presented stone relics—arrowheads, spear-heads, celts, grooved axes, pierced tablets, stone tube, and stone pipe; also fragments of pottery, and bones of man and of animals; minerals, rocks, and ores—red hematite, limonite, quartz crystals, decomposed gneiss, schist, hornblende rock, impure jasper, white mica with feldspar, shale, quartzite, and earthy matter with iron oxide; and shells, recent species of Tennessee *Melaniidæ*. 19387.
- SKIDMORE, P. H. (Washington, District of Columbia), through L. M. Turner presented a dried human hand used as a fetish. 19493.
- SKINNER & SONS (Baltimore, Maryland), through U. S. Fish Commission presented seven builder's models of ships built at Baltimore since 1846. 20547.
- SKINNER, B. D. (Greenport, New York), presented a collection of one hundred and twenty-nine prehistoric stone implements, twenty of them being paleolithic. 20238.
- SKINNER, T. E. (U. S. National Museum), presented a specimen of bird, *Accipiter cooperi*. 19472.
- SMILLIE, GEORGE H. (New York City), presented two pencil drawings by the donor (20296), and a proof (preparatory etching) of "The Rocky Mountains" by James Smillie, after A. Bierstadt. 20355.
- SMILLIE, JAMES D. (New York City), presented sketches and studies (20292) and five progressives of an etching, the work of the donor (20305).
- SMILLIE, L. E. (Washington, District of Columbia), sent a photographic lens (Harrison "C. C.") used by M. B. Brady in making war views, etc. 20716.
- SMITH, C. K. (Klamath Agency, Oregon), presented a prehistoric collection from a mound on the Klamath Indian Reservation, Oregon—four obsidian knives, perforator, two scrapers, one muller, two pestles, one grooved net sinker, three arrow-shaft straighteners, a fragment of stone implement with narrow groove at one end, a brass disk, a brass ornament, three Chinese coins, fragments of melted glass beads, an iron tomahawk, obsidian spear-head, and eight arrowheads; also a mortar and Wo-kus grinder used at the present time by the Klamath and Modoc Indians of Oregon (20434); Chinese coins and a brass or copper disk taken from a small cremation mound on the shores of Klamath Lake, Oregon (20454); a prehistoric collection of implements, ornaments, etc., from a mound on the Klamath Indian Reservation, Oregon; six Chinese coins, two brass buttons, one

SMITH, C. K.—Continued.

brass bracelet, two copper beads, one obsidian perforator, one obsidian arrow-head, one arrow-shaft straightener (grooved pumice stone), and two fragments of human bone; also specimens of a form of moxa used by the Indians of the reservation (20642).

SMITH, Prof. E. A. (University of Alabama, Tuscaloosa, Alabama), presented a specimen of tantalite. 20037.

SMITH, FRANCIS B. (Nantucket, Massachusetts), presented antique candlesticks in tinder-box, flints, steel, also some old tinder. 20703.

SMITH, H. G. (Denver, Colorado), sent bird skins; for examination and report. 20001, 20776.

SMITH, HUGH M. (U. S. National Museum), presented a nest of *Spinus tristis*, and a set of four eggs of *Chelidon erythrogaster* (19456), birds' nests, also bird skins, as follows: *Pandion haliaetus carolinensis*, from Piney Point, Maryland; *Mareca americana*, from Centre Market, Washington, District of Columbia; *Aythya collaris* and *Podilymbus podiceps*, from Mount Vernon, Virginia (19485); shells—two specimens of *Cypraea cylindrica*, from the Indo-Pacific region (19693); Chinese counters composed of mother-of-pearl (19724, 19804); paper currency of Confederate States, denomination fifty dollars; also one thousand dollar note of the State of Mississippi Bank, 1839 (20006).

SMITH, J. W. C. (Benton, Mississippi), presented a vegetable of abnormal growth. 20600.

SMITH, O. C. (Tombstone, Arizona), sent a Coppery-tailed Trogon, *Trogon ambiguus* Gould, for examination and report. 20326.

SMITH, S. W. (Brookville, Pennsylvania), sent bituminous shale, manganese ore, and micaceous schist, for examination and report. 20017, 20095, 20830.

SMITH, Rev. T. W. (St. Joseph, Louisiana), presented a specimen of Lepidoptera, *Tineid* sp. 19508.

SMITH, W. B. (U. S. Geological Survey), presented garnet and topaz on rhyolite, and phenacite on beryl and quartz, from Colorado. 20067.

SMITH, W. R. (Washington, District of Columbia), presented a living opossum. 20213.

SNIDER, Mrs. A. B. (Green Castle, Indiana), sent furnace slag, quartz crystals, decomposed rock, etc., for examination and report. 19963.

SNOWDEN, ROBERT P. (See under Pennsylvania Railroad, 20583, 20728.)

SOLAR, JOSUÉ SMITH (Wilmington, Delaware), presented a hat, such as is worn by the citizens of Chili; also a specimen of Chilian paper currency, *un peso*, and a Chilian silver coin, twenty cents. 20256.

SOULE, H. P. (See under George P. O'Toole, 19929.)

SOUTHERN CONSTRUCTION AND QUARRY COMPANY (Nashville, Tennessee) presented a specimen of "Red Oak" granite, from Red Oak Granite Quarry, Georgia; and sent a specimen of mica-granite for examination and report. 19788.

SPEAR, GEORGE B. (St. Louis, Missouri), sent a specimen of limonite pseudomorph after pyrite for examination and report. 20058.

SPOONER, E. H. (Virginia City, Nevada), sent rocks and white marble for examination and report. 19975.

STABLER, HAROLD D. (Sandy Spring, Maryland), presented a specimen of the Screech-owl, *Megascops asio*. 20236.

STABLER, JAMES P. (Sandy Spring, Maryland), presented a specimen of Cooper's Hawk, *Accipiter cooperi* (19624), and a specimen of the Green Heron, *Butorides virescens* (19591).

STANDARD CHARCOAL COMPANY (Goodrich, Tennessee) presented specimens of wood alcohol in six different stages of its manufacture. 19978.

STATE, DEPARTMENT OF, presented bunting flags of various nations. 19818.

(See also under Shah of Persia, 20378; Australian Museum, 20773.)

STAVANGER MUSEUM (Stavanger, Norway), sent a collection of bird skins, including twenty specimens, in exchange. 19458.

STEARNS, DR. R. E. C. (U. S. National Museum), presented a specimen of the Horned Lizard, *Phrynosoma coronatum*, from San Diego, Cal. (19887); four opium-pipe bowls, two water-holders, and pencil-holder used in writing, and a chunk of sandal-wood chipped and burned in religious services by the Chinese (19941); marine shells, twenty-four specimens, from California; Tertiary fossils; four specimens of *Nassa fossata* Gld., from Santa Barbara, California; ores, rocks, and minerals, seventy specimens, mostly chromite, from California (20260); a book-knife made of "mother-of-pearl" shell, *Maleagrina margaritifera* (20582); fossil brachiopods, *Terebratula harlani* Mort., from the green sand marl of New Jersey; algæ, from Kodiak, Alaska, and egg cases of skate, *Cestracion francisci*, from San Diego, California (20697); and a collection of ten hundred and ten shells, chiefly from California, eastern America, and the Indo-Pacific region (20720).

STEELE, ROBERT L. (Rockingham, North Carolina), sent a boat-shaped object and a jasper bead for examination and report. 20359.

STEELMANN, Capt. THOMAS (Somers Point, New Jersey), presented fishes from the vicinity of Somers Point. 19857.

STEINMETZ, CARL (Helena, Montana) presented a living specimen of the Prairie Dog, *Cynomys columbianus*. 19870.

STEINMEYER, DR. F. A. (Bonaparte, Iowa), presented prehistoric stone implements, one of the paleolithic type, from near Bonaparte. 206-4.

STEPHENS, F. (San Bernardino, California), sent a collection of mammal skins, together with a nest and four eggs of *Poliophtila californica*. (For description of nest and eggs of *Poliophtila californica*, see "Proc. U. S. National Museum," vol. x, pp. 549 and 550). (19381.) Also sent a collection of mammal skins including: *Lepus townsendi*, *Nelomia mexicana*, *Spermophilus tereticaudus*, *Dipodomys deserti*, *Perognathus fasciatus*. (Purchased.) (19462.)

STEPHENSON, CHAUNCEY (West Worthington, Massachusetts) sent a specimen of mica for examination and report. 19764.

STEWART, EDWIN S. (Philadelphia, Pennsylvania) presented a copy of the "Journal of the Franklin Institute" containing illustrations of some early forms of rails. 20820.

STEVENS INSTITUTE OF TECHNOLOGY (Hoboken, New Jersey) presented photograph of the "Stevens" engine, also three photographic copies of tinted drawings of the engine (through W. H. Bristol) (20797), also drawings and description of a steam boiler designed, built, and used by Col. John Stevens in 1826 (through President Henry Morton) (20162); deposited a tubular boiler used in "John Stevens' steam-boat;" and sold to the Museum a duplicate of the propeller of this boat (through President Henry Morton). (20760.)

STEVENS, Hon. ROBERT (U. S. consul, Victoria, British Columbia), sent two Chinese coins found in a Chinese junk in the Sea of Japan, for examination and report. 19888.

STEVENSON, J. A. (Akron, Ohio), presented a collection of prehistoric stone implements containing three hundred and fifty-five specimens, many of them paleolithic, from Summit County, Ohio, and from the vicinity of Port Royal, Juniata County, Pa. 20371.

STEVENSON, J. A. D. (Statesville, North Carolina), presented prehistoric stone implements, twelve of them paleolithic. 20183, 20479.

STEVENSON, Col. JAMES (U. S. Geological Survey), presented specimens of geyserite, calcareous tufa, and pyrite. 20416.

(See also under J. C. Vilas, 19882.)

- STEWART, JOHN T. (Council Bluffs, Iowa), sent marl containing *Productus norwoodi*, from a caisson in the bed of the Missouri River between Omaha, Nebraska, and Council Bluffs, for examination and report. 20746.
- ST. GAUDENS, AUGUSTUS, and THOMAS B. CLARKE, ERWIN DAVIS, and RICHARD GILDER (New York City) deposited original plaster casts of face and hands of Abraham Lincoln, made in April and May, 1860, by Leonard W. Volk, of Chicago, Illinois. Also the first bronze cast of the face mold, and bronze casts of hands. 20084.
- STINE, ANDREW J. (Leavenworth, Kansas), sent fossil-bearing limestone containing iron oxide, for examination and report. 20214.
- STONE, Hon. W. J. (See under J. W. Warfield, 19952.)
- STOUTENBURGH, WALTER S. (Washington Asylum, District of Columbia), presented a living specimen of the Barn Owl, *Strix flammea*. 20736.
- STRAIT, N. A. (U. S. Pension Office), presented a specimen of postal currency, twenty-five cents, 1862. 20319.
- STRATTON, C. L. (Chattanooga, Tennessee), presented a collection of prehistoric stone implements, containing four hundred and thirty-six specimens, from Georgia and Alabama. 20240.
- STROEBEL, L. H. (Massillon, Ohio), presented photograph of pipes of Puget Sound Indians. 19415.
- STUART, F. T. (Boston, Massachusetts), presented eight progressive proofs from a plate in mixed manner, engraved by the donor. 20291.
- STUBBS, W. P. (Charlestown, Massachusetts), sent an oil-painting of four-masted schooner *King Phillip*. 20777.
- STUDER, Hon. ADOLPH G. (See under Sultan of Sambas, 20638.)
- STUFFLEBEAM, J. G. (Delaney, Arkansas), sent iron pyrites and a mineral supposed to contain silver, for examination and report. 19457, 19570.
- STURTEVANT, Dr. E. LEWIS (South Framingham, Massachusetts), presented two scrap-books containing drawings of maize described in 3d Annual Report of the New York Agricultural Experiment Station (20029), an unique and interesting collection of beans (20106), and one hundred and fifty-four heads of named varieties of wheat (20153).
- STUTTS, FREDERICK I. (See under Pennsylvania Railroad.)
- SULTAN OF SAMBAS (through Hon. Adolph G. Studer, United States consul at Singapore) presented four samples of bilian, or iron-wood, from Borneo. 20638.
- SWAN, JAMES G. (Port Townsend, Washington), sent two models of Indian lodges and a carved totem-post. (Purchased.) 19477.
- SWARR, D. M. (Lancaster, Pennsylvania), presented a book entitled "Origin of the Indians of the New World and of the West Indies" by Fr. Gregorio Garcia, second edition, Madrid, 1729. 20504.
- SWEENEY, T. W. (U. S. National Museum), presented two knives and three old carpenter tools. 19619.
- SWETT, FREDERICK K. (U. S. Pension Office), presented two bronze copies (obverse and reverse) of the silver medal issued by Joseph I, King of Hungary, in commemoration of victories gained over the Turks. 19576.
- SWIFT, WILLIAM (Columbus, Ohio), presented a badge of the reunion of the Second Cavalry Brigade, Columbus, Ohio, August 17, 1887. 19612.
- TALIAFERRO, SUSAN (Alexandria, Virginia), presented an iron cake-cutter over one hundred years old, made by a blacksmith. 20164.
- TANNER, Capt. Z. L. (U. S. Fish Commission, commanding U. S. Fish Commission steamer *Albatross*), presented a Menhaden, *Brevoortia tyrannus*, found floating in the harbor at Baltimore. 19397.
- TARVIN, WILLIAM F. (Perryville, Arkansas), sent a specimen of ore for examination and report. 19557.

- TASSIN, Col. A. G., U. S. Army (Fort Wood, New York Harbor), presented birds killed by flying against the light of the statue of Liberty on Bedloe's Island (19698, 19707); also sixty specimens, comprising thirteen species, from Bedloe's Island (19730).
- TASTET, W. M. (Washington, District of Columbia), presented a collection of one hundred and twenty-two postage-stamps from various foreign countries. 20219.
- TATE, E. O. (Morristown, Tennessee), sent a fragment of the carapace of a Sea-turtle, probably *Thalassochelys caretta*, from North Carolina, for examination and report. 19881.
- TAUNT, Lieut. E. H., U. S. Navy, presented ethnological objects from the Kassai River, Central Africa. 20681.
- TAYLOR & BRUNTON (Leadville, Colorado), presented sulphide ores, with a series of products of dressing. 19671.
- TAYLOR, GEORGE L. (Cheyenne, Wyoming), sent four living specimens of the Prairie Dog, *Cynomys ludovicianus*; also a pair of abnormal antlers of Elk. 19876.
- TAYLOR, J. L. (Effie, Jackson County, North Carolina), sent chromite, asbestos, corundum, and muscovite, for examination and report. 20553.
- TAYLOR, W. EDGAR (Peru, Nebraska), sent a collection of fossil shells, containing one hundred and twenty-six specimens, for examination and report. 19644.
- TAYLOR, WILLIE (Four Mile Run, Virginia), presented a specimen of the White Egret, *Ardea egretta*. 19420.
- TAYLOR, ZACH (Dunkirk, New York), sent bird skins for examination and report. 20657.
- TECHNOLOGICAL MUSEUM (Sydney, New South Wales), through Hon. G. W. Griffin, United States consul, presented one hundred and thirty-six samples of wool from Victoria, Tasmania, New South Wales, and Queensland. 20798.
- TEGIMA, S. (See under Tokio Educational Museum, 19914.)
- TERRELL, L. D. (U. S. Fish Commission), sent two living specimens of the Woodchuck, *Arctomys monax*. 20694.
- TEUBNER, CHARLES (Lexington, Missouri), presented eleven photographs representing flint arrowheads, etc. 20329.
- THOMPSON, CHARLES A. (Quincy, Michigan), presented prehistoric stone implements, some of them paleolithic, from Branch and Hillsdale Counties, Michigan (20353); and lent a bird-shaped prehistoric stone object, for casting (20471).
- THOMPSON, E. E. (Toronto, Canada), lent birdskins, for comparison and study, at the request of the Curator of Birds (19383), also sent birds from Canada in exchange (19933, 20792).
- THOMPSON, MELVILLE. (See under Charles W. Richmond, 19891.)
- THOMPSON, R. J. (through Forsberg & Murray, Washington, District of Columbia), presented a miniature blacksmithing outfit, and samples of work done with the same. 19636.
- THOMPSON, Capt. THOMAS (Schooner *M. A. Bastan*), through W. A. Wilcox, Gloucester, Massachusetts, presented a fish, *Thyrstitops violaceus*, n. s., Bean. Type. Described in Proceedings of U. S. National Museum," vol. x, 1887, pp. 513, 514. 19784.
- THOMPSON, Paymaster WILLIAM J., U. S. Navy, presented ethnological objects from Easter Island: Spear-heads, paddles, oars, clubs, skulls, tapa, feather head-dress, wooden idols, stone implements, etc. (20078), and twenty-seven photographs of Easter Island (20511).
- THORNE, CLINTON (Washington, District of Columbia), presented a living specimen of White Rat. 20202.
- THORNTON, J. L. (Washington, District of Columbia), presented an invitation to the twenty-first anniversary John A. Rawlings Post, No. 1, G. A. R., 1887; badge Department of the Potomac, twenty-first national encampment, St. Louis, 1887; and card of admission to memorial service General Grant, October 1, 1886. 19821.

- THORPE, Captain (schooner *Annie Wesley*, Gloucester, Massachusetts), presented a skin of the Leather-back Turtle. 19655.
- THORPE, Dr. H. H. (Liberty Hill, Texas), presented a piece of dentigerous bone. 19507.
- THORPE, RUSSEL (Laramie County, Wyoming), through J. A. George, Washington, District of Columbia, presented marble from Wyoming. 20082.
- TIFFANY & CO. (New York City) sent cut stones: Labradorite medallion, fruit tablet of rock crystal, carnelian, rhodonite and serpentine, and sections of agatized wood, and of malachite and azurite. 20816.
- TODD, E. R. (U. S. National Museum), presented a copper coin, one-half cent, 1828 (19726), a miscellaneous lot of alcoholic insects from Texas (20028), and a Red-breasted Grossbeak, *Zamelodia ludoviciana* (20575).
- TOKIO, DEPARTMENT OF EDUCATION (Tokio, Japan), presented lacquer work from Japan. 19789.
- TOKIO, EDUCATIONAL MUSEUM (Tokio, Japan), presented a saddle from Loochoo, India (19478); and sent in exchange bird skins from Japan (19478), and meteoric stones containing iron; anorthite crystals from a lava stream during the eruption of 1874; and sapphire crystals from tin washings (19914).
- TONER, Dr. J. M. (Washington, District of Columbia), presented a navel orange with smaller one completely inclosed within it. 20695.
- TOOKER, WILLIAM WALLACE (Sag Harbor, New York), presented sixteen paleolithic prehistoric stone implements from the vicinity of Sag Harbor, New York. 20418.
- TOPPAN, C. (Salem, Massachusetts), presented a specimen of petroleum ointment, a reputed antidote for rattlesnake bite. 20676.
- TOPPAN, GEORGE L. (Chicago, Illinois), sent bird skins from Texas and California for examination and report. 20348.
- TOWERS, H. C. (See under Col. W. H. Havners, 19579.)
- TOWNSEND, CHARLES H. (Fish Commission), United States, presented mammals: *Dasyprocta punctata*, *Didelphys cinerea*, *D. quica*, *Nasua narica*, *Tatusia novemcinctus*, *Sciurus hypopyrrhus*, and two bats; also bird skins from Honduras (19715); silver coins of Guatemala, 2 reals, 1873, 25 cents, 1881; Honduras, 25 cents, 1885; and Nicaragua, 20 cents, 1887 (19757); fishes from Honduras and the Caribbean Sea; ethnological objects, a small but valuable collection of plants, one hundred and eighteen skeletons of birds, three hundred and twenty-five bird skins,* reptiles, birds' nests (including nest of *Ostinops montezumae*, a polished celt, squirrels (*Sciurus hypopyrrhus* and *S. tephrogaster*), from Honduras, and a collection of insects containing a considerable number of bright and attractive specimens, representing some of the more common species of that locality (19811).
- TRASK, Rev. H. K. (Bridestown, New Jersey), sent a Chinese zither or cremona, in exchange. 20758.
- TREASURY DEPARTMENT:
- Bureau of Engraving and Printing presented proofs of paper money and bonds of the United States (19556), and a specimen of bank-note engraving by S. A. Schoff (through John A. O'Neill, superintendent of the engraving division) (20235).
 - U. S. Life-Saving Service. (See under Capt. Herbert M. Knowles, 19633; also under Amasa Bowen, 20473).
 - U. S. Revenue Marine (through courtesy of Hon. Peter Bonnett, Chief of U. S. Revenue Marine; and Capt. M. A. Healy, U. S. Revenue Marine steamer *Bear*) presented six bidarkas, from Alaska. 19774.
 - U. S. Light-House Board. (See under W. N. Quinn, 21002.)

* See Proc. U. S. National Museum, vol. x, 1887, p. 572.

- TROCADÉRO MUSEUM (Paris, France), through Dr. E. Hamy, director, presented full costume of a Roman soldier. A lay figure for this costume was prepared by M. Hébert, of the Trocadéro Museum, by permission of the director. This was purchased by the U. S. National Museum. 19985.
- TROMSOE, M. FOSTIC (Spitzbergen, Norway), sent two eggs of *Gavia alba*, from Spitzbergen. (Described in "The Auk," 1888, vol. v, No. 2, p. 202). 20136.
- TRUE, F. W. (U. S. National Museum), presented a Rat, *Mus decumanus*, with abnormal dentition. 19482.
- TRUE, Mrs. F. W. (Washington, District of Columbia), presented silver and copper coins of Roumania, Rome, Prussia, Belgium, Greece, Spain, France, Austria, and Luxembourg. 19740.
- TUCKER, MILTON T. (Fairfax Court House, Virginia), sent sulphide of copper and iron, chalcopyrite with decomposition products, principally carbonate of copper in a siliceous gangue (19769), also black sand (19924), for examination and report.
- TULLBERG, Dr. TYCHO (University of Upsala, Upsala, Sweden), presented skull and horns of European Elk. 19454.
- TURNER, CHARLES J. (Brunswick, Missouri), sent stone implements for examination and report. 20660.
- TURNER, Dr. G. K. (Morristown, Tennessee), sent insect for name. 20510.
- TURNER, J. S. (Ashland, Alabama), sent ore for examination and report. 20527.
- TURNER, L. M. (See under P. H. Skidmore, 19493.)
- TURNER, W. C. (Hood's Landing, Roane County, Texas), sent a specimen of galena, from Texas, for examination and report. 19480.
- TWEED, J. W. (Ripley, Brown County, Ohio), presented prehistoric stone implements (19696, 19801, 20629) and fossil shells, Cincinnati Lower Silurian (20629); and sent prehistoric stone implements in exchange (19499, 19587), and for examination and report (19587).
- TYREE, J. S. (Washington, District of Columbia), presented a specimen of *Eacles imperialis*. 19416.
- UBER, C. EDGAR (Falls Church, Virginia), presented four living specimens of the Screech-owl, *Megascops asio*. 20635.
- UNDERWOOD, L. M. (Syracuse, New York), presented Arachnida and Myriapoda from Georgia, Virginia, and New York. 19526, 19533, 19542, 19571.
- UPHAM, E. P. (U. S. National Museum), presented prehistoric stone implements, fifty-five specimens, from the vicinity of Piney Branch, District of Columbia. 19491.
- UTAH SALT COMPANY (Ogden, Utah) sent samples of salt for examination and report. 19814.
- VAIL, STEPHEN (Morristown, New Jersey), presented a piece of the telegraph wire over which the first telegraph message was transmitted. The message, "A patient waiter is no loser," was sent by Alfred Vail at one end of the 3-mile wire, stretched around the walls of a room in the Speedwell Iron Works, at Morristown, New Jersey, to S. B. Morse at the other end, January 6, 1838. 20318.
- VANCE, JOHN. (See under W. H. Pratt, 20283.)
- VAN DOREN, W. T. (Washington, District of Columbia), presented a wooden pipe used by the Cherokee Indians, and pipe pouch and catlinite pipe, from the Ogallala Sioux (19745); and sent in exchange a head-dress and pair of leggings worn by Sioux Indians; quartz and spinel with calcite; a fragment of a calamitian stem; and a concretion from Indian Territory. (19423).
- VAN ELTEN, K. (New York City), presented pencil drawings and etchings by the donor. 20282.
- VEACH, N. T. (Rushville, Illinois), sent two hematite celts; for examination and report. 19770.

- VILAS, J. C. (Livingston, Montana), through Col. James Stevenson presented chrysocolla, chalcedony, and limonite. 19882.
- WAKEFIELD, M. (Annandale, Virginia), presented an albino Snow-bird, *Junco hyemalis*. 19996.
- WALCOTT, CHARLES D. (See under Interior, Department of the, U. S. Geological Survey, 19845, 20789.)
- WALDEN, GILBERT B. (Washington, District of Columbia), presented an oil-painting said to be the work of Mrs. President Madison, left unfinished at her death (19841); a pardon granted to John Walden for his participation in the late rebellion, signed by President Andrew Johnson, dated September 9, 1865; also marshal's order of parade on the occasion of the reception to Lafayette at Warrenton, July 12, 1834 (20328).
- WALES, ORLANDO G. (Washington, District of Columbia), presented a living Squirrel, *Sciurus carolinensis carolinensis*. 20474.
- WALKER, CHARLES A. (Boston, Massachusetts), presented monotypes, an engraving with roulette tint by the donor, and etchings and engravings, finished and unfinished. 20290, 20592.
- WALKER, HON. J. P. (See under H. C. Sholl, 20246.)
- WALKER, JAMES W. (Washington, District of Columbia), presented six living specimens of Virginia Quail, from Madison County, Virginia. 20128.
- WALLACE, JOHN (New York City), sent a mounted pack-mule. 20823.
- WALLIS, J. G. (Benton, Arkansas), presented rocks from Arkansas. 19609.
- WALTERS, J. W. (New York City), presented a model of steam fishing-launch. 19940.
- WANMER, A. (York, Pennsylvania), sent a sandstone slab bearing tracks, in exchange. 20023.
- WAR DEPARTMENT (through Brig. Gen. S. V. Benét, U. S. Army, Chief of Ordnance) presented a paper model of an equestrian statue of General McPherson; section of an oak cut down by musket balls, from near Spottsylvania Court House, Virginia; and a Mexican saddle and bridle manufactured in Mexico for General Trevino, and presented by him to General E. O. C. Ord, U. S. Army. 20209.
- WARD, HENRY A. (Rochester, New York), sent in exchange a small collection of fishes from the Gulf of Campeachy, including the following species: *Cynoscion*, *Trisotropis*, *Mugil*, *Caranx*, *Cephalacanthus*, *Monacanthus*, *Sparisoma*, *Arius*, *Anisotremus*, *Batrachus*, *Gerres*, *Diplodus*, and *Hemulon* (19424); horns of *Saiga tartarica*, *Hippotragus equinus*, *Alcelaphus caama*, *Alcelaphus* sp.?, and head of *Oryx capensis* (20099); a collection of exotic mammals, chiefly African and Asiatic (20645); also sent a Sable Antelope, *Hippotragus niger* (19935).
- WARD & HOWELL (Rochester, New York) presented two slices of the Rockwood meteorite (19917), also meteoric stone from Fayette County, Texas (20187), and sent a specimen of meteoric iron, in exchange (19917).
- WARD, JAMES A. (Thornfield, Missouri), sent ore for examination and report. 19738.
- WARD, JOSEPH (Ward's, South Carolina), presented a collection of prehistoric stone implements containing ninety specimens. 20470.
- WARFIELD, J. W. (Eddyville, Kentucky), through Hon. W. J. Stone, sent a pipe for examination and report. 19952.
- WARREN, Dr. B. H. (West Chester, Pennsylvania), presented thirty-five specimens of bird skins (20602), and sent others in exchange (20808); also sent a specimen of the Bronzed Grackle *Quiscalus quiscula aeneus*, for examination and report (20403).
- WARREN FEATHERBONE COMPANY (Three Oaks, Michigan) presented samples to illustrate the manufacture of "feather-bone," a substitute for whale-bone (20091), and plumage quills taken from the turkey and used in making dusters, feather-bone dress-stays, corsets, whips, etc. (20548.)
- WARREN, J. H. (Oregon, Tennessee), sent ore for examination and report. 20499.

- WASHINGTON, L. B. (See under George P. O'Toole, 19929.)
- WATKINS, G. W. (Moriah, New York), sent a specimen of bituminous shale for examination and report. 20599.
- WATKINS, J. E. (U. S. National Museum), presented fractional currency, three cents, and postal note, one cent, 1883, United States (20222); also autograph letter from Hon. Alexander H. Stephens, dated September 1, 1879 (20386).
- WATSON, SERENO (Cambridge, Massachusetts), presented ferns from Costa Rica. 19868.
- WAY, NATHANIEL (Accotink, Virginia), presented prehistoric stone implements, twenty-nine specimens, twenty of them paleolithic. 19862, 20185, 20507.
- WEAVER, C. A., & Co. (New York City), sent a specimen of *Centropomus undecimalis*, from Georgia, for examination and report. 19977.
- WEBB, J. C. (See under Pennsylvania Railroad, 20824.)
- WEBB, JOHN S. (Locust Level, North Carolina), presented a Chameleon, *Anolis principalis*. 20806.
- WEBSTER, GEORGE A. (Milwaukee, Wisconsin), presented a celt gouge, from Gurnee, Illinois. 19473.
- WEBSTER, Mrs. M. H. (Georgetown, District of Columbia), sent in exchange a Cockatoo Parrakeet, *Nymphicus novæ-hollandiæ*. 19682.
- WEEDEN, W. C. (U. S. National Museum), deposited living specimens of Black Fantail Pigeons, and common pigeons. 20444.
- WEEKS, J. D. (See under Robert Hadfield, 19905.)
- WEHRLE, R. W. (Blairsville, Pennsylvania), sent insect for name. 19409.
- WELLING, Dr. JAMES C. (Columbian University, Washington, District of Columbia), deposited an eider-down rug from Sweden. 20402.
- WELLS, L. B. (Helena, Montana), presented abnormal elk antlers. 19877.
- WERDERMAN, C. (Calera, Alabama), sent a specimen of rock for examination and report. 19483.
- WERTH, J. W. (Stockton, Virginia), sent shale colored by iron oxide, and a vein rock composed essentially of quartz, feldspar, white mica, and black tourmaline; also a few decomposed garnets, for examination and report. 20536.
- WESLEYAN UNIVERSITY, MUSEUM of (Middletown, Connecticut), sent in exchange shells, four hundred and sixty species—pulmonates, bivalves, and marine gastropods. 19680.
- WESTGATE, WILLIAM WALTER (Houston, Texas), sent shells for examination and report. 20122.
- WETHERELL, FRANK E. (Oskaloosa, Iowa), presented a cast of a stone pipe. Original found in Mahaska County, Iowa. 20699.
- WHITCOMB, O. (Leavenworth, Kansas), sent ore for examination and report. 20107.
- WHITE, Dr. C. A. (U. S. Geological Survey), presented gypsum from Texas. 20038.
- WHITE, C. S. (Romney, West Virginia), through Hon. W. L. Wilson, House of Representatives, sent a specimen of galena in limestone, for examination and report. 19938.
- WHITE, G. W. (Webster, Mississippi), sent a specimen of siliceous sandstone for examination and report. 19525.
- WHITE, Prof. I. C. (Morgantown, West Virginia), sent an insect, *Gryllotalpa borealis*, for examination and report. 19566.
- WHITEHEAD, W. T. (Norfolk, Virginia), presented a Lump fish, *Cyclopterus lumpus*. 20433.
- WHITESIDE, J. M. (Keysville, Charlotte County, Virginia), presented Coleoptera and Hymenoptera—*Dynastes tityus* and nest of *Vespa maculata*. 19899.
- WHITLACH, JACOB (Bannon, West Virginia), through Hon. N. Goff, sent a specimen of iron pyrite containing a little copper, for examination and report. 20426.
- WHITMAN, W. J. (Etheridge, South Carolina), sent pharyngeals of Carp, and portion of spine of pectoral fin of Cat-fish, for examination and report. 20644.

- WHITMORE, GEORGE C. (Nephi, Utah), sent mineral wax, for examination and report. 19470.
- WHITNEY, E. J. (Brooklyn, New York), presented wood-cut proofs by E. D. Hayes, Alexander Anderson, J. H. E. Whitney, A. Whitney, E. J. Whitney, and other American engravers; also process drawings by the donor, and impressions from process blocks from drawings by the donor. 20800.
- WHITTEN, W. A. (Molina, Mississippi), sent ethnological objects dug from the ground at Molino; namely, horse-bits, cups and saucers, an old copper kettle, beads, old silver ornaments, etc. (Purchased.) 20377.
- WIDDOWSON, J. W. (London, England), presented stone sleeper block and plate over which Trevithick's locomotive ran between Pen-y-darren Works, Methyr, and the Glamorgan Canal, at Abedare Junction, in 1808; also spike by which the plate was held to the block. 20745.
- WIER, J. D. (Pontotoc, Texas), sent micaceous hematite in siliceous material for examination and report. 19992.
- WILCOX, A. C. (Washington, District of Columbia), sent Watertown quartzite pebbles for examination and report. 20280.
- WILCOX, Dr. T. E., U. S. Army (Fort Niobrara, Nebraska), sent a specimen of the Short-eared Owl, *Asio accipitrinus*, for examination and report. 20101.
- WILCOX, W. A. (Gloucester, Massachusetts), presented two specimens of *Squilla empusa* from Providence, Rhode Island (19807), and a fine specimen of coral *Paragorgia arborea*, from off Banquereau (20123).
(See also under Capt. Thomas Thompson, 19784.)
- WILKINSON, Ensign ERNEST, U. S. Navy, presented syenite, nummulite, and mortar from Pyramid of Cheops, Egypt. 19991.
- WILLARD, Rev. GEORGE L. (Washington, District of Columbia), presented an object found on the prairie in Indian Territory, supposed to be a "fossil sponge." 20309.
- WILCOX, JOSEPH (Media, Pennsylvania), lent shells, for comparison and study, at the request of the Curator of Mollusks—*Melongena corona* Gm., to show varieties; also invertebrate fossils from Florida. 20710.
- WILLIAMS, Prof. H. C. (Cornell University, Ithaca, New York), sent fossil wood from the Devonian formation of New York, for examination and report. 20340.
- WILLIAMS, H. F. (Fairbank, Arizona), presented a fragment of a shell ornament made from the shell of *Pectunculus (Axinaca) intermedius* Brod, found about eight feet below the surface at Fairbank, Arizona. 20354.
- WILLIS, MERRITT (West Farms, New York), presented three prehistoric stone implements, paleolithic, from Trenton, New Jersey, and West Chester, Pennsylvania. 20331.
- WILLISTON, Dr. S. W. (New Haven, Connecticut), presented a collection of Diptera, two hundred and sixty-three species, seven hundred and twenty-nine specimens of the family Syrphidae. This collection is almost complete and is the best extant of the family. (See "Bulletin U. S. National Museum," No. 31.) 19702.
- WILLOUGHBY, CHARLES (U. S. Indian agent, Quinalt Agency, Washington), presented a specimen of a new genus, new species of fish, *Acrotus willoughbyi*. (See "Proc. U. S. National Museum," vol. x, 1887, p. 631.) 19957.
- WILSON, Mrs. F. B. (Washington, District of Columbia), presented a Double Yellow-head Parrot, *Amazona oratrix*. 20569.
- WILSON, JAMES H. (Gillenwater, Tennessee), sent a mixture of quartz granules and iron oxides for examination and report. 20124.
- WILSON, JOHN, & SON (Cambridge, Massachusetts) presented specimens to illustrate the art of wood-cut printing. 20589.
- WILSON, Col. JOHN M., U. S. Army (Washington, District of Columbia), presented the original life-size plaster model of the statue of George Washington, erected at Washington's headquarters at Newburgh. 19947.
- WILSON, Dr. L. D. (Wheeling, West Virginia), presented a cup-stone. 19741.

- WILSON, THOMAS (U. S. National Museum), presented ethnological objects: Japanese mirror, Roman bronze lamp, wooden sabots, two cuneiform contract tablets from Babylon, Roman glass seal, fine comb, and a Munich calendar (19851); an image used in phallic worship, from Italy (19920); prehistoric stone implements of the Tertiary geologic period, three specimens from Thenezay, France (20019); a collection of three hundred and eighty-three prehistoric stone implements, from the District of Columbia, Pennsylvania, and New Jersey (20034); and deposited a mediæval missal, engrossed and illuminated on parchment and bound in boards (19530); coins and medals belonging to the late Dr. Rau (deposited by the administrator of his estate) (20061); twenty-three drawings by artists of the seventeenth century, and three miniatures in ivory by unknown artists (20393); Venetian glass bottle of the sixteenth century (20539); one chromolith by Kellerhoven, after Filippino Lippi, and seven drawings by unknown artists (20626); and two knives from Norway (or Sweden) (20699).
- WILSON, Hon. W. L. (House of Representatives), sent limestone with crystals of pyrite and chalcopyrite, for examination and report. 20016.
(See also under C. S. White, 19938.)
- WILTHERS, C. T. (Piqua, Ohio), presented prehistoric stone implements, fifty-seven specimens, from the Miami River. 20311.
- WINCHESTER REPEATING ARMS COMPANY (New Haven, Connecticut) deposited a single-shot rifle. 20805.
- WINDSOR, D. A. (Washington, District of Columbia), sent a chert nodule from limestone formation, for examination and report. 19460.
- WINSTON, ISAAC (U. S. Geological Survey), presented photographs of relief maps of Great Basin and Pacific coast region, and of San Diego Bay. 20410.
- WISE, F. A. (Washington, District of Columbia), presented ore from Loudoun County, Virginia. 19414.
- WITHERS, E. F. (Eddyville, Kentucky), presented a Spanish coin, silver one-real pieces of Charles IV. (20044); and sent a coin dated 1190, for examination and report (20163).
- WOLTZ, G. W. (U. S. National Museum), presented a card of St. Patrick's Society of St. Joseph, Missouri (19578), and war relics consisting of engraved portraits of generals, and military envelopes and songs issued during the war of 1861-65 (19815).
- WOLTZ, WILLIAM (Washington, District of Columbia), presented an Edison incandescent lamp, 16-candle power (damaged). 20397.
- WOOD, F. E. (Phoenix, Michigan), presented a valuable collection of plants. 19886.
- WOOD, JOSEPH (Red Bank, New Jersey), presented a model of a railroad frog patented by Joseph Wood in 1861. 20428.
- WOOD, NELSON R. (U. S. National Museum), deposited a pair of Virginia Quails, a pair of Homing Pigeons, with record and pedigree, a pair of Ring Doves, and a pair of Australian Grass Parrakeets, living specimens. 20399, 20455.
- WOOLBRIDGE, J. (Milan, Missouri), presented a photograph of head of a stone idol. 19436.
- WOOSTER, A. F. (Norfolk, Connecticut), presented a pupa of *Philampelus achemon*. 19492.
- WORTH, R. N. (curator of Plymouth Museum, Plymouth, England), presented ten samples of English marble (20383), and sent rocks from England in exchange (19385).
- WORTH, S. G. (Franklin, Virginia), presented specimens of canned sturgeon, caviar, roe in brine, German salt, and salted and dried sturgeon; also negatives illustrating the sturgeon industry at Delaware City (19390); fishes, *Roccus lineatus*, with parasites from gills of same, and *Clupea mediocris* (19692) and cypress wood used in the manufacture of paper, also paper made from same (19780).
- WORTH, S. J. (Stockton, Virginia), sent ores for examination and report. 19737,

- WORTHEN, CHARLES K. (Warsaw, Illinois), sent skins of mammals. (Purchased.) 20538, 20693.
- WRIGHT, B. H. (Penn Yan, New York), lent shells, for comparison and study, at the request of the Curator of Mollusks, twenty species of *Unionidae* from Florida. Many of these are types of new species (19765); also sent shells for examination and report (19532).
- WRIGHT, D. W. M. (Holly Brook, Virginia), sent a specimen of galena for examination and report. 20389.
- WRIGHT, JAMES C. (Fredonia, Ohio), presented prehistoric stone implements, forty-six specimens, from Licking County, Ohio. 20550.
- WUNDERLICH, H., & CO. (New York City) sent forty prints of various kinds. 20802.
- WYMAN, DR. EDWARD (Upper Alton, Illinois), presented a miner's iron candlestick, called "Sticking Tommy," 20529.
- YALE COLLEGE MUSEUM (New Haven, Connecticut), through Prof. O. C. Marsh, presented a cast of *Dinoceras*. 20448.
- YASTE, W. J. (Bureau of Ethnology), presented a living specimen of Opossum from Maryland. 20053.
- YEATES, HON. JESSE J. (Washington, District of Columbia), presented a clay vessel from the Holston River in the vicinity of Knoxville, Tennessee. 20160.
- YOUNG, H. G. (See under Delaware and Hudson Canal Company.) 19904, 20761.
- YOUNG, JAMES A. (Cedar Point, Page County, Virginia), sent a specimen of mica-ceous hematite for examination and report. 19431.
- ZELEDON, JOSÉ C. (San José, Costa Rica), presented prehistoric stone implements, five specimens, bird skins and eggs of *Merula tristis* and of *Crax globicera* (19796, 20809), and sent three specimens of Paradise Trogon, *Pharomacrus costaricensis*. (19536.)
- ZELLER, CONRAD (Washington, District of Columbia), presented a Tufted Titmouse, *Lophophanes bicolor* (20233), and a Black-headed Caique Parrot, *Caica melanocephala* (20783).
- ZELLER, FRED (Washington, District of Columbia), presented a Double Yellow-head Parrot, *Amazona oratrix*. 20057.
- ZENG, HENRY L. de (Geneva, New York), presented two concretions (19630); and sent a specimen of hydrocarbon, found in small bowlders imbedded in slate rock, for examination and report (19544).
- ZOOLOGICAL MUSEUM OF ACADEMY OF SCIENCES (St. Petersburg, Russia) lent bird skins, for comparison and study, at the request of the Curator of Birds. 19481.
- ZOOLOGICAL SOCIETY OF PHILADELPHIA (Philadelphia, Pennsylvania), through Arthur E. Brown, presented a skeleton of Crimson-eared Waxbill, *Estrela phaeicotis* Sev. (19407); a Kangaroo, *Halmaturus* sp. (19430); an Iguana (19572); a Lady Amherst's Pheasant, *Phasianus amherstiae* (19577); a monkey and a parrot (19598); an Anaconda, *Eunectes murinus* (19618); a White Opossum, *Didelphys virginianus* (19621), a Demoiselle Crane, *Anthropoides virgo* (19649); a Parrakeet, *Palaornis alexandri* (19791); a Squirrel, *Sciurus bicolor* (19848); a Monkey, *Senomopithecus maurus*, from Java (19892); a Monkey, *Cercopithecus campbelli* (20064); a Harnessed Antelope, *Tragelephus scriptus* (20113); and an Adjutant Stork, *Leptoptilus javanicus*, from India (20564).

INDEXES TO ACCESSION LIST.

INDEX A.—By localities.

INDEX B.—By departments in the National Museum.

INDEX A.

AFRICA.

	Accession number.		Accession number.
Albany Museum	19959	Grant-Bey, James	19601, 19747, 20440
Aldrich, T. H.	19855	Hornaday, William T.	20188
Bartlett, Edward	20993	Kunz, George F.	19805
Brewster, Miss	20334	Maspero, G.	20421
Brown, Mrs. M. E.	19847	Taunt, E. H.	20681
Cambridge University	19673	Wilkinson, Ernest	19991
Carpenter, P. Herbert	20483		

AMERICA.

NORTH AMERICA.

BRITISH AMERICA.

Benedict, A. L.	20365	Jordan, D. S.	19979
Boas, Franz	19597	McGuire, John	20373
Crosby, W. O.	19528	McIlwraith, F.	20515
Donaldson, Thomas	19467	Merriam, C. Hart	19422
Fish Commission, United States.	19588	Mowat, Thomas	19593, 20382
Geol. and Nat. Hist. Survey of Canada	19951	Ober, Andrew K.	19968
Hazen, Mrs. Mildred McLean ...	20458	Sharples, S. P.	20137
Interior, Department of the, U. S. Geological Survey	20409	Thompson, E. E.	19383, 19933, 20792
		Wilcox, W. A.	20123

DANISH AMERICA.

Hazen, Mrs. Mildred McLean	20458
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MEXICO.

Bastow, I. W.	19785	Leon, Nicholas	20119
Batchelor, Ward	19376	Palmer, Edward	20170, 20605, 20608
Brewster, William	19944, 20039	Pringle, C. G.	20430
Dugès, A.	20097	Rovirosa, José N.	20463, 20691, 20756
Fritsch, E.	19678	War Department	20209
Hyde, George Byron	19708		

ALABAMA.	Accession number.	Accession number.	
Aldrich, T. H	19695	Estes, E. D	19366
Avery, William C	20477, 20559, 20598, 20616, 20658, 20671, 20696, 20732	Goode, G. Brown	20757
Beers, Anthony	19560	Harrison, Virgil T	19850, 19897
Brown, J. T	19520	Hay, C. D	19677
Clark, G. H	20492	Hill, Robert T	20779
Clitherall, George Burgwin	20031	Indiana State University	19889
Davenport Academy of Natural Sciences	20751	Knight, W. C	19550
Hoxie, R. L	20707	Kunz, George F	19986
McAlpine, J. B	19354	Martin, L. S	19641
Morgan, J. T	19375, 19660	McRae, Thomas C	19602
Purnell, J. H	20457	Nelson, S. J	19442
Russell, I. C	20262	Stufflebeam, J. G	19457, 19570
Smith, E. A	20037	Tarvin, William F	19557
Stratton, C. S	20240	Wallis, J. G	19609
Turner, J. S	20527		
Werderman, C	19483		
ALASKA.		CALIFORNIA.	
Aldrich, H. L	20407	Allen, J. Isham	20493
Hazen, Mrs. Mildred McLean	20458	Bates, C. P	20790
Robeson, Mrs. George M	20537	Bryant, Walter E	19927
Stearns, R. E. C	20697	Bureau of Ethnology	19465
Treasury Department, United States Revenue Marine	19774	Bush, Mrs. A. E	19368
		California State Mining Bureau	19497, 20321
ARIZONA.		California State Mining School	20203
Allen, J. Isham	20493	Chatard, T. M	19755
Arthur, Mrs. R. W	20247	Coquillett, D. W	20336
Benson, H. C	19352, 19363, 19452	Frost, L. L	20162
Bidwell, Mrs. C. A	20489	Goss, N. S	20540
Brown, Herbert	20478, 20541, 20683, 20685, 20708	Green, Loren W	20322
Carpenter, W. L	19670, 19759, 19808	Hanks, Henry G	20068
Cunningham, C. W	20339	Hawley, E. H	20442
Merriam, C. W	20152	Hemphill, Henry	20543, 20739
Merrill, George P	19388	Interior, Department of the, U. S. Geological Survey	19911
Metchke, Otto	20667	Luce, Israel	20422
Price, W. W	20743	Merrill, George P	19388, 19775
Schmid, Louis, & Sons	20126	Miller, John	20366
Shufeldt, R. W	19776	Orcutt, C. R	20721
Smith, O. C	20326	Palmer, Edward	20170, 20608
Williams, H. F	20354	Pendleton, J. C	20425
ARKANSAS.		Pratt, W. H	20228
Aulk, H. J	19519	Price, Thomas	19617, 20606
Berry, James H	19419	Price, T. S	19446
Colhouer, E. H	19561	Price, W. W	19840, 20306
Cotman, A. J	19398	Quicksilver Mining Company	20762
Davenport Academy of Natural Sciences	20751	Randall, A. Frank	20263
		Stearns, R. E. C	19887, 20260, 20697, 20720
		Stephens, F	19381, 19462
		Toppan, George L	20348
		COLORADO.	
		Aiken, C. E	19471
		Allen, J. Isham	20493

	Accession number.	DELAWARE.	Accession number.
Barker, George F.....	19441	Harlan & Hollingsworth Com- pany	20509
Brenniger, G. F.....	19447	McLean, H. C.....	19717
Brunton & Taylor.....	19691	Worth, S. G.....	19390
Cockerell, Theodore D. A.....	19697,		
	19861, 20075	DISTRICT OF COLUMBIA.	
Colorado Smelting Company....	20021	Anderson, W. S.....	20752
Crowkhite, A. H.....	19667	Army Medical Museum.....	20759
Gale, Denis.....	19970	Baird, Mrs. Mary H. C.....	20129
Interior, Department of the, U. S. Geological Survey.....	20047, 20156	Bartlett, J. R.....	19371
Morrison, Charles F.....	19958	Bayer, W. H. von.....	19620
Shields, Charles O.....	19444	Bean, T. H.....	20674, 20750
Smith, H. G.....	20001, 20776	Beckwith, Paul.....	20070, 20332, 20379
Smith, W. B.....	20067	Berger, William H.....	20218
		Blue, L.....	19634
CONNECTICUT		Boswell, R. H.....	20127
Beckwith, Cyrus G.....	19690	Boulding, George.....	20212
Bolton, H. Carrington.....	20831	Brown, J. E.....	19875
Cilley, Tristram.....	19827	Brown, S. G.....	20731
Clark, John N.....	19382	Bureau of Ethnology.....	19373, 20249
Colt's Patent Fire-Arms Manu- facturing Company.....	20814	Burger, Peter.....	20727
Ellsworth, E. W.....	20179	Carlin, William P.....	19966
Faucher, G. L.....	19852	Champagne, W. W.....	20526
Graves, Miles W.....	20664	Clark, A. Howard.....	19608
Linton, W. J.....	20269	Cooper, W. B.....	20771
New England Mining Company.....	19786	Coumbe, Eppa Hunton.....	20201
Niemeyer, John H.....	20475	Dall, W. H.....	20646
Olmstead, E. S.....	20014	Day, Mrs. C. C.....	20090
Peffer, James H.....	19648, 19720	Demonet, Mme., and Son.....	19365
Perry, E. A.....	19830	Dix, Miss D. L.....	19890
Preston, A. B.....	19679	Dougal, W. H.....	20627
Rice, William North.....	20100	Duly, A. A.....	20071
Shepard, James.....	19711	Eustis, Mrs. J. B.....	20778
Wesleyan University.....	19680	Everett, Mrs. J. H.....	20476
Williston, S. W.....	19702	Fish Commission, United States.....	19588,
Winchester Repeating-Arms Co.....	20805		20000, 20079, 20411
Wooster, A. F.....	19492	Fisher, A. K.....	19758, 20169
Yale College.....	20448	Fletcher, Robert.....	20080
		Ford, Frank.....	20453
DAKOTA.		Foster, Mrs. Mary F.....	19558
Blow, William N.....	20424	Fox, W. H.....	19668
Bond, W. R.....	20033	Furgueson, T. E.....	19936
Cherrie, George K.....	20314	Gant, A.....	19657
Coe, Henry W.....	20253	Goodall, F. H.....	20811
Creel, H. M.....	20615	Goode, G. Brown.....	19568, 20197, 20580
Crosby, W. O.....	19750	Graves, E. O.....	20184
Davenport Academy of Natural Sciences.....	20751	Hampson, Thomas.....	20110
Davis, O. V.....	19869	Hardesty, J. R. S.....	19782
Hornaday, W. T.....	19880	Hartleben, C. A. von.....	19964
Lange, Charles T.....	19723	Heitmuller, Alfred.....	20812
Scott, Samuel.....	19843, 20498	Henshaw, H. W.....	19762
		Hessel, Rudolph.....	20230, 20455
		Hine, L. G.....	19923
		Hornaday, William T.....	19894, 20042, 20049

	Accession number.
Hemphill, Henry.....	20166
Herron, Charles S.....	20431, 20748
Hood, H. D.....	19355
Jordan, D. S.....	20145
King, F. G.....	20520
King, John.....	20652
Mathers, G. M.....	20566
McCarthy, Gerald.....	20687
McCrary, J. A.....	20530
Merriam, C. Hart.....	20729
Mills, Robert A.....	19487
Park, E. H.....	20316
Pierce, H. D.....	20568
Quinn, W. M.....	21002
Richmond, C. W.....	19943
Rickards, T. M.....	20577
Schwarz, E. A.....	19535, 20639
Simpson, Charles T.....	20073
Willcox, Joseph.....	20710

GEORGIA.

Ellis, J. Frank.....	19866
Interior, Department of the, U. S. Geological Survey.....	19976
Southern Const. and Quarry Co.....	19788
Stratton, C. L.....	20240
Underwood, L. M.....	19526, 19533, 19542
Weaver, C. A., & Co.....	19977

IDAHO.

Allen, H. L.....	19372
Curtis, Patrick.....	19438
French & Kinney.....	20655
Gay, C. A.....	19878
Hornaday, William T.....	19880
Sawtell, Gilman.....	19803

ILLINOIS.

Adams, W. H.....	20177, 20481
Allen Paper Car Wheel Co.....	20534
Bridgman, A., jr.....	20663
Chicago, Burlington and Quincy Railroad.....	20810
Coale, H. K.....	19393
Davenport Academy of Natural Sciences.....	20751
Illinois State Laboratory of Nat- ural History.....	20395
McFall, D. M.....	19567
Poling, O. C.....	20092
Ridgway, Joseph H.....	20229
Schneck, J.....	20051, 20650
Veach, N. T.....	19770

	Accession number.
Webster, George A.....	19473
Worthen, Charles K.....	20538, 20693
Wyman, Edward.....	20529

INDIANA.

Beachler, Charles S.....	20255, 20692
Black, E. C.....	20178
Bollman, C. H.....	20155
Butler, Amos W.....	20151, 20438, 20618
Collett, John.....	19983
Dodge, Wallace H.....	19706
Green, G. K.....	20362, 20633
Hanna, H. W.....	20180, 20717
Indiana State University.....	19889
Jeffers, Isaac S.....	19564
Lemon, John H.....	19386, 19658
McCormick, Mrs. Sarah C.....	19714
Preston, J. W.....	20535
Snider, Mrs. A. B.....	19963

INDIAN TERRITORY.

Folsom, J. W.....	19434
Simpson, Charles T.....	20722
Van Doren, W. T.....	19423
Willard, George L.....	20309

IOWA.

Adams, A. F.....	19646
Aldrich, Charles.....	19725
Call, R. Ellsworth.....	19351, 19517, 19710
Cherrie, George K.....	20314
Davenport Academy of Natural Sciences.....	20751
Ham, C. D.....	19622
Hockhaus, F. W.....	19428
Indiana State University.....	19889
Kummerfield, J. F.....	19510
Meigs, M.....	20662
Nutting, C. C.....	20528
Steinmeyer, F. A.....	20684
Wetherell, Frank E.....	20669

KANSAS.

Coffy, John.....	20392
Denham, Jennie L.....	19728
Gilliland, A. L.....	19392
Goss, N. S.....	19389
Hickok, Frank.....	19515
Hill, W. S.....	19484, 19826
Newlon, W. S.....	19896, 20181, 20460, 20581
Shellack, E. H.....	20678
Stine, Andrew J.....	20214
Whitcomb, O.....	20107

KENTUCKY.	Accession number.		Accession number.
Adams, Charles H	20117	Huddleson, George	20333
Burns, W. R	19627, 19834, 20027	Jefferson, Mary Eliza	19399
Holbert, J. C	20022	Johnson, W. F	20398
Jaggers, J. A	19867	Lyon, Hall & Co	20503
Johnson, J. T	20557	Machenheimer, G. L	20103, 20135, 20200, 20243, 20245, 20400
McCormick, Mrs. Sarah C	19714	Marshall, George	19664, 19686, 19690, 20173, 20451
Mechlin, A. H	20227	Marshall, Henry	19652, 20056, 20335
Owsley, W. T	20463, 20648, 20649, 20740	McCarty, W. T	19859
Rodman, James	19543	Merriam, C. Hart	19781
Rutherford, Horace	19585	Nye, Willard, jr	20480
Ryan, Blake	20045	Palmer, Joseph	20052
Warfield, J. W	19952	Palmer, William	20607
Withers, E. F	20044, 20163	Peck, F. H	20041
LOUISIANA.		Pollock, G. F	20611
Bolton, H. Carrington	20043	Ray, Alfred	20654
Fry, F. G	20532	Reed, John W	20775
Hamlin, R. H	19427	Rice, Moses	19799
Hemphill, Henry	20543	Richardson, W. G	20656
Jack, W. H	20394	Sellner, J. J	20223, 20742
James, S. H	20514	Skinner & Sons	20547
Lawrence, George N	20782	Smith, Hugh M	19485
Raby, St. George R., jr	19973	Stabler, Harold D	20236
Sandos, W. A	19671, 19962	Stabler, James P	19591, 19624
Smith, T. W	19508	Todd, E. R	20575
MAINE.		Tanner, Z. L	19397
Boardman, George A	19995	Yaste, W. J	20053
Bumpus, L. I	19463	MASSACHUSETTS.	
Douglass, A. B	20015	Andrew, John, & Son	20621
Gamage, A. T	20251	Asbestos Packing Company	20199
Knowlton, James E	20612	Barclay & Company	20754
Lamb, T. S	19749	Barrett, William H	19377
Merrill, George P	19546	Boston Boxwood Company	20588
	19553, 19581, 19594	Boston Museum of Fine Arts	20298
Merrill, L. H	20427	Boston Society of Natural His- tory	19361, 19584, 19599, 19662
Perry, N. H	20215, 20338	Bosworth, G. L	19842
Sawyer, C. M	19946, 20046	Brewster, William	19417, 19909
MARYLAND.		Chadbourne, A. P	20035
Abbott, W. H	20055, 20088	Chamberlain, C. W	20146
Baltimore and Ohio Railroad Company	20796, 20822	Chase, G. N	19378
Boggs, J. O	20054	Cheney, Mrs. Edna D	20272
Bolles, T. Dix	19700	Closson, William B	20827
Coffin, C. E	20002	Cory, Charles B	19360, 19838, 19839, 19926
Fish Commission, United States	19873, 20659	Daniels, George F	20546
Fisher, A. K	19863, 20432	Davis, H. J	19380
Freeman, F. L	20452	Delaney, Patrick	19901
Gedz, August	20098	Denham, Charles S	19513
Hamlin, William C	19865	Denton, S. W	20786
Hobbs, W. H	20700	Edwards, Vinal N	19727
		Fillebrown, F. E	20829

	Accession number.	MISSISSIPPI.	Accession number.
Fish Commission, United States.	19426, 19640, 19727, 19893, 19908, 19910, 19925, 19942, 19945, 19954, 20000, 20008, 20079, 20120, 20125, 20131, 20232, 20257, 20317, 20405, 20414, 20517, 20637, 20643, 20673, 20680, 20737.	Bessac, F. T.	20226
Forbes, R. B.	20441, 20704, 20821	Burchart & Co.	19385
Forbush, E. H.	20576	Interior, Department of the, U. S. Geological Survey.	19554, 19555
Hinckley Locomotive Works.	20408	Long, W. B.	19956
Holmes, William H.	19369	Medford, Harvey C.	20726
Jacobs, S. M.	19806	Smith, Hugh M.	20006
Jeffries, J. Armory	20436	Smith, J. W. C.	20600
Jensen, Lawrence.	20764	White, G. W.	19525
King, George C.	20512	Whitten, W. A.	20377
Koehler, S. R.	20293, 20469, 20604		
Lowell, John A., & Co.	20299	MISSOURI.	
Marshall, John.	19795	Call, R. Ellsworth.	19710
Martin, S. J.	20486, 20730	Crawford, Marion.	20252
Merrill, George P.	19592	Hurter, Julius.	19965
Museum Comp. Zool., Cambridge, Mass.	19731, 20074, 20172	Lienan, D. B.	20711
Nye, Willard, jr.	19989, 20579	McGlumphy, G. W.	20617
Peabody Academy of Sciences ..	20159	Reynolds, George D.	19688
Prang, L., & Co.	20593, 20610, 20640	Schraubstadter, Carl, jr.	20396
Prang, Louis.	20286	Sickles, F. E.	20574
Rich, Shebna.	20563	Spear, George B.	20058
Russell & Richardson.	20624	Teubner, Charles.	20329
Schoff, Stephen Alonzo.	20280	Turner, Charles J.	20660
Sharples, S. P.	20115, 20149	Walker, J. P.	20246
Smith, Francis B.	20703	Ward, James A.	19738
Stephenson, Chauncey.	19764	Woolbridge, J.	19436
Stuart, F. L.	20291		
Stubbs, W. P.	20777	MONTANA.	
Sturtevant, E. Lewis.	20029, 20106, 20153	Allen, J. Isham.	20493
Thompson, Thomas.	19784	Allen, R. T.	20679
Thorpe, Captain.	19655	Babcock, E. C.	19450, 19595
Toppa, C.	20676	Beacom, J. H.	20072
Walker, Charles A.	20290, 20592	Beck, W. H.	20139
Wilson, John, & Son.	20589	Forrestell, James.	20186
		Hornaday, William T.	19879
MICHIGAN.		Magoun, George C.	19783
Miller, Charles.	19596	Merriam, C. Hart.	20630
Palmer, William.	19763	Nelson, Christian.	20505
Patrick, L. S.	20350	Peale, A. C.	19919, 20195
Richmond, Charles W.	19736	Romeyn, Henry.	20535
Ruggles, Charles.	20208, 20420	Steinmetz, Carl.	19870
Sheldon, W. H.	20807	Vilas, J. C.	19882
Thompson, Charles A.	20353, 20471	Wells, L. B.	19877
Warren Featherbone Co.	20091, 20548		
Wood, F. E.	19886	NEBRASKA.	
		Blackford, E. G.	20586
MINNESOTA.		Indiana State University.	19889
Horan, Henry.	19629	Nowell, Frederick D.	20597
Indiana State University.	19889	Stewart, John T.	20746
Noah, John M.	20147	Taylor, W. Edgar.	19644
		Wilcox, T. E.	20107

NEVADA.		Accession number.			Accession number.
Butler, E. J.	.....	20012	Pearce, Richard	.....	20167
Maynard, William D.	.....	19884	Riley, C. V.	.....	20384
Ober, Andrew K.	.....	19968	Rouse, C. W.	.....	19443
Russell, I. C.	.....	20570	Rynerson, J. H.	.....	19665
Spooner, E. H.	.....	19975	Shufeldt, R. W.	.....	19401, 19540, 19615, 19719, 19802, 20595
NEW HAMPSHIRE.			NEW YORK.		
Fox, W. H.	.....	19704	Adams, W. W.	.....	19506, 20248, 20456
Hitchcock, C. H.	.....	19999	American Angler	.....	19709
Hodge, E. B.	.....	19898, 20018	American Museum of Natural His- tory	.....	19611, 19773
Pike, A. F., Manufacturing Com- pany	.....	19364	Avery, S. P.	.....	20799
Quackenbos, John D.	.....	19853	Barnum, M. K.	.....	19527, 20412
NEW JERSEY.			Battey, Charles	.....	19494
Bean, T. H.	.....	19453, 19659	Baxter, R. L.	.....	20485
Blackford, E. G.	.....	19766	Beecher, C. E.	.....	19823
Bowen, Amasa	.....	20473	Benedict, A. L.	.....	20365
Burns, Frank	.....	19832	Bennett, L. J.	.....	19949
Carr, James	.....	19734	Bierstadt, Albert	.....	20356
Eaton, J. M. C.	.....	19466, 19501	Blackford, E. G.	.....	19666, 19733, 20449
Fish Commission, United States.	.....	19659	Boas, Franz	.....	19425
Francis, Joseph	.....	20391	Bobbett, Albert	.....	20641
Garrison, H. S.	.....	20133	Bolton, H. Carrington	.....	19931, 19982
Greenwood Pottery Company	.....	20109	Brooks Locomotive Works	.....	20508
Harris, Theodore S.	.....	19408	Castle, Frederick A.	.....	20801
Hidden, W. E.	.....	19787	Central Park Menagerie	.....	19476, 20010
Hoskin, Robert	.....	20268	Century Company	.....	20108, 20196
Interior, Department of the, U. S.	.....		Cherrie, George K.	.....	20314
Geological Survey	.....	19849, 20733	Church, F. S.	.....	20277
Kunz, George F.	.....	19805, 19916, 20308	Church, Joseph & Co.	.....	19836
Merriam, C. Hart	.....	19651	Cockcroft, J. M.	.....	19521
Merrill, George P.	.....	19511, 19516	Corrine, Leverett	.....	20675
New Jersey Sugar of Milk Com- pany	.....	19626	Delaware and Hudson Canal Company	.....	19904, 20761
Pennsylvania Railroad Company	.....	20494, 20583, 20729	Devenger, George W.	.....	20562
Quintin, Andrew	.....	20313	De Vinne, Theodore L.	.....	20264
Royle, John, & Sons	.....	20625	Duly, A. A.	.....	19860
Shick, Charles S.	.....	20755	Elten, K. van	.....	20282
Stearns, R. E. C.	.....	20697	Erdtmann, W. & H.	.....	20237
Steelman, Thomas	.....	19857	Falconer, J. M.	.....	20666
Stevens Institute of Technology.	.....	20162, 20760, 20797	Farrer, Henry	.....	20284, 20590
Trask, H. K.	.....	20758	Forrester, George B.	.....	19928
Vail, Stephen	.....	20318	Galvin, Charles D.	.....	20032
Willis, Merritt	.....	20331	Gifford, R. Swain	.....	20285
Wilson, Thomas	.....	20034	Gould, A. L.	.....	19809
Wood, Joseph	.....	20428	Hakes, W. A.	.....	20521
NEW MEXICO.			Harper & Bros	.....	20301, 20591, 20828
Chatfield, Silas	.....	19418	Heinemann, E.	.....	20271
Cooney, M.	.....	20144	Hicks, Thomas R.	.....	19573
Lincoln, O.	.....	20036	Hill, John Henry	.....	20281
			Hoe, R., & Co.	.....	20622
			Hornaday, William T.	.....	20715

	Accession number.		Accession number.
Interior, Department of the, U. S.			
Geological Survey	19845	Underwood, L. M.	19751
John, Andrew, jr.	20224	Wallace, John	20823
Kappes, Alfred	20276	Walters, J. W.	19940
Kemp, J. F.	19987	Ward & Howell	19917
Keppel, Frederick, & Co.	20803	Ward, Henry A.	19424
Kilham, L. C.	20518		19935, 20099, 20645
Kimmel & Voigt	20297	Watkins, G. W.	20599
King, F. G.	20406	Whitney, E. J.	20800
Klackner, C.	20288	Williams, H. C.	20340
Kunz, George F.	19805	Willis, Merritt	20331
Lattin, Frank	19903	Wright, B. H.	19532, 19765
Lawrence, George N.	19412	Wunderlich, H., & Co.	20802
Lukanitsch, M., jr.	20619	Zeng, Henry L. de	19544, 19630
Lusk, F. C.	20369		
Mather, Fred.	19767, 20204, 20234, 20364	NORTH CAROLINA.	
Maurer, Louis	20275	Devereaux, J.	19687
McAllister, Joseph	19439	Elliott, F. O.	20506
Meder, Ferdinand	20804	Harris, T. C.	19524
Merrill, J. C.	19752	Haywood, Howard	20357
Military Academy, U. S.	19685	Hidden, W. E.	20157
Miller, Charles H.	20279	Kunz, George F.	19805
Moran, Thomas	20294	Lewis, Willis	20555
Moran, Mrs. M. Nimmo	20295	Linehan, P., & Co.	19359, 19404
Nicoll, J. C.	20283	Luther, W. N.	20747
Ostrander, T. L.	20718	MacRae, Donald	19705
Owen, W. O., jr.	19357	McCarthy, Gerald	19729
Paez, Don Ramon	20388	McLaughlin, R. B.	19400
Parke, Edmund B.	20211	Nye, Willard, jr.	20480
Parsons, Charles	20300	Olds, Frederick A.	20025
Pavy, Mrs. Lillie May	20614, 20793	Schreiber, W. A. H.	19455
Penfield, S. L.	20415		19722, 19824, 20011
Phillips, Barnet	20567	Steele, Robert J.	20359
Photogravure Company	20324	Stephenson, J. A. D.	20183, 20479
Railway Gazette	20495	Tate, E. O.	19881
Richmond, A. G.	20784	Taylor, J. L.	20553
Riker, C. B.	19523, 19600	Webb, John S.	20806
Ritter, S.	19856	Worth, S. G.	19780
Roulet, F.	20688		
Rowland, Thomas	20794	OHIO.	
Sarony, Napoleon	20289	Acker, H. P.	20361
Sennett, George B.	19356	Baker, J. U.	19829
	19739, 19846, 19934	Bell, Carey	20413
Sharp, George B.	20620	Betty, E. G.	19689
Shirlaw, Walter	20287	Bowers, T. B.	19631
Simmons, George C.	19509	Burnet, William	19642
Skinner, B. B.	20238	Conant, Ambrose	19391
Smillie, George H.	20296, 20355	Conrad, L.	19906, 19960
Smillie, James D.	20292, 20305	Doane, W. H.	20647
St. Gaudens, Augustus	20084	Dyche, D. T. D.	20174
Tassin, A. G.	19698, 19707, 19730	Ellis, L. H.	20522
Taylor, Zachary	20657	Faris, Lafayette	19771
Tiffany & Co.	20816	Freshwater, I.	20189
Tooker, William Wallace	20418		

	Accession number.		Accession number.
Gallaher, J. W	19613	Donaldson, Thomas.....	19467, 20265, 20320
Gardner, P	19932	Dwight, Theodore F	20719
Gilbert, Charles H	20670	Eagle, H. M	19502
Green, W. E	19403	Emons, C. T	19820, 20482
Hampton, W. C	19461	English, G. L., & Co	20815
Herzer, H	20261	Flaxman, H	20558
Hinman, H. E	20596	Foote, A. E	20516
Hoffman, J. B	19628	Gerner, J. M. M	20191
King Iron Bridge Manufactur- ing Company	20496	Grant-Bey, James	19601
Lane, Sylvanus	19538	Green, Charles S	19718
Mercer, R. W	19625, 20556	Hart, Charles Henry	20273
Mercia, F. M	19500	Hayden, Mrs. Emma V	20446
Miller, D. A	19605	Hovender, Thomas	20274
Moorehead, Warren K	20148	Hyatt, P. F	20701
	20330, 20689	Jackson, Thomas H	19900, 19950
Morris, Scott	20165	Lea, Isaac [deceased]	20423, 20525
Myers, Peter	20578	Lopor, W. H	20487
Nissley, J. R	20345	Moore, Albert	20341
Palmer, J. S	19475	Moran, Emily K	20267
Stevenson, J. A	20371	Moran, Peter	20266
Swift, William	19612	Moyer, Henry C	19837
Tweed, J. W	19499	Mullins, William J	20307
	19587, 19696, 19801, 20629	Nagle, Harry	19822
Wiltheiss, C. T	20311	O'Malley, Mr	20601
Wright, James C	20550	Parrish, Stephen	20270
OREGON.		Pennsylvania Railroad Company	19433, 20435, 20490, 20561, 20768, 20824, 20500
Bensal, R. A	20004	Rittenhouse, N. M	20484
Brewster, William	20788	Row, A. M	20741
Brown, W. Q	20303	Schwarz, G. A	20819
Case, R. W	20712	Sharples, A	20158, 20429, 20603
Cunnigham, Howard C	19895	Smith, S. W	20017, 20095, 20830
Lamb, J. E	20665	Steuart, Edwin S	20820
Melville, John	19871	Stevenson, J. A	20371
Merrill, J. C	19384, 19469, 19748	Wanner, A	20023
Morris, Scott	20165	Warren, B. H	20403
Smith, C. K	20434, 20454, 20642	Warren, B. H	20602, 20808
PENNSYLVANIA.		Wehrle, R. W	19409
Atterbury & Co	20523	Wilson, Thomas	20034
Beath, James W	20818	Zoological Society of Philadel- phia	19407, 19430, 19481, 19572, 19577, 19598, 19618, 19621, 19649, 19791, 19848, 20113, 20064
Bell, William	20770	RHODE ISLAND.	
Bement, C. S	20066	Church, Joseph & Co	19854
Bodecker, J. K	20551	Crosby, W. O	19528
Brill, J. G., Company	20472	Jenks, J. W. P	19589
Brown, J. W	20714	Keach, M. A	19761
Brown, Mrs. M. E	20030	Knowles, Herbert M	19590, 19633
Davis, Howard B	20210	Kunz, George F	19805
Day, D. T	19902	Merrill, George P	19514
Diller, J. S	20206	Wilcox, W. A	19807
Dithridge Flint Glass Company.	20686		

SOUTH CAROLINA.	Accession number.
Cleveland, Vannoy	19953
De Le Mater, L. M.	20370
Du Pré, D. A.	19586
Jackson, E. E.	19413
Manigault, G. E.	20059
Shepard, Charles U.	20020, 20026
Ward, Joseph	20470
Whitman, W. J.	20644
Frasier, S. S.	20087

TENNESSEE.	
Barker, James M.	19353
Bayless, W. C.	20352
Butler, R. R.	20390
Cleveland, Hon. Grover	20050
Cooper, W. F.	19760
Drake, J. N.	19606
Green, J. A.	20198
McCormick, J. C.	19435, 19464, 19474, 19545, 19548
McCormick, Mrs. Sarah C.	19714
Mort, E. W.	19410
Nissley, J. R.	20345
Null, James M.	20545
Reynolds, A. D.	19583, 19742
Sewell, J. A.	19614
Sisk, C. T.	19387
Southern Const. and Quarry Co..	19788
Standard Charcoal Company	19978
Turner, G. K.	20510
Turner, W. C.	19480
Yeates, Jesse J.	20160
Warren, J. H.	20499
Wilson, James H.	20124

TEXAS.	
Beatty, J. C.	20502
Beckham, C. W.	19440, 19997
Benners, G. B.	19732
Boyle, C. B.	20138
Burns, W. C.	20780
Clark, Eugene.	19569
Colton, O. B.	20447
Cummings, W. F.	19858
Doan, C. F.	20005
Eberle, Eugene E.	20176
French, Clarence E.	20682
Greenwood, E. C.	20104
Heaton, L. D.	19539
Jones, T. D.	19810
Lindberg, J. J. E.	20143
Miner, S.	19512
Myers, John	19445
Ragsdale, G. H.	19990, 20439
Riddle, J. W.	20076

	Accession number.
Seekler, L. W.	19562
Singley, J. A.	19694, 19790
Thorpe, H. H.	19507
Todd, E. R.	20028
Toppa, George L.	20348
Ward & Howell	20187
White, C. A.	20038
Wier, J. D.	19992
Westgate, William Walter.	20122

UTAH.	
Brown, C. G.	19939
Byrne, Mr.	20069
Davidson, W. M.	20725
Davenport Academy of Natural Sciences	20751
Higgins, C. W.	19872
Salomon, Frederick	20349
Utah Salt Company	19814
Whitmore, George C.	19470

VERMONT.	
Chubb, Thomas H.	19437, 19844
Colburn, G. F. I.	19486
Fairbanks, E. and T., & Co.	20738
Knowlton, F. H.	19395
Perkins, G. H.	20554, 20734

VIRGINIA.	
Agnew, John P.	19800
Ballou, E.	20241
Bement, C. S.	20066
Beverly, J. B.	20190
Bordine, J. H.	19746
Brown, George E.	20060
Carey, Mrs. Mattie Ward.	19522
Carlisle, N. F.	20744
Carr, W. B.	20065
Collett, R. H.	20250
Colson, James M., jr.	19721
Crawford, A.	20326
Drake, Mrs. James H.	19529
Dunnington, F. P.	20105
Davis, Miss Deborah D.	19772
Duly, A. A.	20231
Easterday, William D.	20134
Fish Commission, United States.	19653, 19713
Gant, Charles B.	20259
Garner, R. L.	19907
Golden, R. A.	20724
Grinnan, A. G.	19656
Hall, Charles	19549
Helton, W. E.	19534
Hepner, J. H.	20112

CENTRAL AMERICA.

	Accession number.		Accession number.
Alfaro, Anastasio	19797, 20096	Museum Nacional de Costa Rica ..	19798
Beckwith, Paul	20304	Oerlein, R.	19835
Boston Society of Natural His- tory	19451	Ridgway, Robert	19370
Fleming, J.	19701, 19819	Townsend, C. H.	19715, 19757, 19811
Godman, T. D.	20007	Watson, Sereno	19-68
McNiel, J. A.	19699	Zeledon, José C.	19536, 19796, 20809

SOUTH AMERICA.

Acevedo, José	19703	Kunz, George F.	19805
Boston Society of Natural His- tory	19451	McDonald, Angus	20217
Brooks, P. H.	19574	McDonald, Mr.	20337
Champagne, W. W.	20526	National Museum of Brazil	20192
Cockran, A. W.	20111	Raby, St. George R.	19972
Currie, J. M.	19794	Riker, C. B.	19768
Kauffmann, Rudolph	20571	Roberts, W. T.	19681
		Solar, Josué Smith	20256

ASIA (INCLUDING MALAYSIA).

Adair, Oliver Belton	19411	Jouy, P. L.	19537, 19616, 19638, 19792 19813, 19825, 20114, 20150, 20161, 20220
Adler, Cyrus	19969	Kang Chin-hi.	20254
Bartlett, Edward	20093	Lovett, Edward	20116
Bayard, Thomas F.	20315	Lyon, Hall & Co.	20503
Boehmer, George H.	19777	Mason, O. T.	20040, 20465
Bolles, T. Dix.	19429, 19793, 20443	Rice, William T.	19468
Brown, Mrs. M. E.	19847, 20030, 20239	Samson, Mrs. G. C.	19833
Caldwell, Henry	19754	Shah of Persia	20378
Church, F. S.	20623	Smith, Hugh M.	19693, 19804
Clarke, F. W.	20142	Stearns, R. E. C.	19941, 20720
Cory, Charles B.	19674	Stevens, Robert	19888
Diller, J. S.	20367	Sultan of Sumbas.	20638
Gerrard, Edward	20677	Tokio, Department of Education	19789
Goldfuss, Otto	20372	Tokio, Educational Museum.	19478, 19914
Goode, G. Brown.	20197, 20368	Townsend, E. B.	20787
Goward, Gustav	19374	Wilson, Thomas	19851
Grebnitzky, N.	20086	Zoological Society of Philadel- phia	19892, 20564
Greey, E.	21176		
Henson, Harry V.	19405		
Hornaday, William T.	20242		

EUROPE (INCLUDING GREAT BRITAIN).

American Museum of Natural History	20363	Bond, S. H.	19604
Bartlett, Edward	20093	British Museum	19915
Beckwith, Paul	19716, 20304 20332, 20379, 20461	Butler, F. H.	19885, 20817
Bement, C. S.	20066	Chalmers, Patrick	20205
Bergen Museum	20465	Chatellier, Paul du	19495
Bessels, Emil.	20121	Dresser, H. E.	19971
Bigelow, Miss	20062	Durand, John	20278
Boehmer, George H.	19777, 19779	Echaurren, Francisco	19961
		Eckfeldt, J. W.	19744
		Faeltz, Mrs. A. M.	19547

	Accession number.		Accession number.
Fischer, Henri A.....	20404	Parke, C. A.....	20534
Fritsch, E.....	19678	Ransom, William.....	20668
Gillian, R.....	20387	Rau, Charles (deceased).....	19931
Goldfuss, Otto.....	20372	Ravené, Gustave.....	19645, 19663
Gregory, J. R.....	19918	Readwin, T. A.....	19743
Hadfield, Robert.....	19905	Rice, William T.....	19468, 19632
Hayward, W. R.....	19921	Robinson, Miss Violet.....	20385
Hendricks, Mrs. C. I.....	20519	Royal Gardens, Kew.....	20488
Henson, Samuel.....	19883	Schuette, J. H.....	19637
Hough, Walter.....	20400	Scott, Alexander.....	20216
Howarth, Elijah.....	20401	Seeborn, Henry.....	19448, 20327
Kloczewski, A. M.....	19675	Siemaschek, J. von.....	19988
Koehler, S. R.....	20417, 20587	Stavanger Museum.....	19458
Lovett, Edward.....	20116, 20225	Swarr, D. M.....	20504
MacLean, J. P.....	19994	Swett, Frederick K.....	19756
Mather & Platt.....	20531	Trocadero Museum.....	19985
Mather, Fred.....	20132	Tromsø, M. Fostic.....	20136
Maynard, G. W.....	19575	True, Mrs. F. W.....	19740
McDonald, Angus.....	20217	Tullberg, Tycho.....	19454
Müller, August.....	19955	Welling, James C.....	20402
Musée d'Histoire Naturelle.....	19396	Widdowson, J. W.....	20745
National Academy of Sciences...	19331	Wilson, Thomas.....	19851, 19920 20019, 20539, 20699
Nehrkorn, A.....	19980		
Netherlands Government.....	19913	Worth, R. N.....	19358, 20383

OCEANICA.

AUSTRALASIA.

Australian Museum.....	20773	Kunz, George F.....	20083
Bartlett, Edward.....	20093	MacDonald, A. C.....	20375
Brown, Mrs. M. E.....	19847	Mueller, Ferdinand von.....	20360
Drew, S. H.....	19580	Technological Museum, Sydney..	20798

POLYNESIA.

California Academy of Sciences.	19531	Parke, Davis & Co.....	19610, 19712
Carr, W. B.....	19607	Queen of Hawaii.....	20085
Knudsen, Valdemar.....	20560	Thomson, William J.....	20078, 20511
Lang, John C.....	20774, 20791		

INDEX B.

DEPARTMENT I.

ARTS AND INDUSTRIES.

	Accession number.		Accession number.
Adair, Oliver Belton.....	19411	Church, F. S.....	20277, 20623
Adams, A. F.....	19646	Clark, A. Howard.....	19608
Alfaro, Anastasio.....	19797	Clark, Eugene.....	19569
Allen Paper Car Wheel Company	20584	Clarke, F. W.....	20142
Andrew, John & Sons.....	20621	Cleveland, Vannoy.....	19953
Army Medical Museum.....	20759	Clitherall, George Burgwin.....	20031
Arthur, Mrs. R. W.....	20247	Closson, William B.....	20827
Atterbury & Co.....	20523	Cooney, M.....	20144
Avery, S. P.....	20799	Currie, J. M.....	19794
Baird, Mrs. Mary H. C.....	20129	Dall, W. H.....	20616
Balto. and Ohio R. R. Co.....	20796, 20-22	Davis, Miss Deborah D..	19772
Barclay & Co.....	20754	Day, Mrs. C. C.....	20090
Barrett, William H.....	19377	Day, David T.....	20524
Beekwith, Cyrus G.....	19390	Delaware and Hudson Canal Company.....	19904, 20761
Beekwith, Paul.....	19716, 20070, 20304, 20332, 20379, 20461	DeVienne, Theodore L.....	20264
Bell, William.....	20770	Dithridge Flint Glass Company.	206-6
Berger, William H.....	20218	Donaldson, Thomas...19167, 20265, 20320	
Bessac, F. T.....	20226	Dougal, W. H.....	20627
Betty, E. G.....	19689	Durand, John.....	20278
Bierstadt, Albert.....	20356	Dwight, Theodore F.....	20719
Bigelow, Miss.....	20062	Echaurren, Francisco.....	19961
Bobbett, Albert.....	20641	Erdtmann, W. and H.....	20237
Boehmer, George H.....	19777, 19779	Faehtz, Mrs. A. M.....	19547
Bolton, H. Carrington.....	19981, 19982, 20831	Fairbanks, E. and T. & Co....	20738
Bond, S. H.....	19604	Falconor, J. M.....	20666
Boston Box-wood Company.....	20588	Farrer, Henry.....	20284, 20590
Brooks Locomotive Works.....	20508	Fillebrown, F. E.....	20829
Brown, John E.....	19654	Fish Commission, United States.	20411
Brown, Mrs. M. E.....	19847, 20030, 20239	Flaxman, H.....	20558
Burnet, William.....	19642	Forbes, R. B.....	20441, 20704, 20821
Bush, Mrs. A. E.....	19368	Francis, Joseph.....	20391
Brill, J. G., Company.....	20472	Fraser, Charles A.....	20698
Caldwell, Henry.....	19754	Gallaher, J. W.....	19613
Carr, James.....	19734	Gifford, R. Swain.....	20285
Carr, W. B.....	19607	Gilliam, R.....	20387
Castle, Frederick A.....	20801	Goodall, F. H.....	20311
Century Company.....	20108, 20196	Goode, G. Brown.....	20197
Chalmers, Patrick.....	20205	Grant-Bey, James.....	19601
Champagne, W. W.....	20526	Graves, E. O.....	20184
Chase, G. N.....	19378	Graves, Miles W.....	20664
Chatellier, Paul du.....	19495	Green, Charles S.....	19718
Cheney, Mrs. Edna D.....	20272	Greenwood Pottery Company...	20109
Chicago, Burlington and Quin- cey Railroad Company.....	20810	Ham, C. D.....	19622
		Hardesty, J. R. S.....	19782

	Accession number.		Accession number.
Harlan & Hollingsworth Co....	20509	Miller, Thomas C.	2075
Harper & Bros.	20301, 20591, 20828	Moore, Albert.	20341
Hart, Charles Henry.	20273	Moran, Emily K.	20267
Hayden, Mrs. Emma V.	20446	Moran, Mrs. M. Nimmo.	20295
Hayward, W. R.	19921	Moran, Peter.	20266
Heinemann, E.	20271	Moran, Thomas.	20294
Hendricks, Mrs. C. I.	20519	Museum of Fine Arts, Boston. .	20298
Hill, John Henry.	20281	Nachnian, L.	19379
Hinckley Locomotive Works. .	20408	National Academy of Sciences. .	19831
Hoe, R. & Co.	20622	New Jersey Sugar of Milk Com- pany.	19626
Hoffman, J. B.	19628	Nicoll, J. C.	20283
Holmes, William H.	19369	Niemeyer, John H.	20475
Horan, Henry.	19629	Noah, John M.	20147
Hornaday, William T.	20242	Olds, Frederick A.	20025
Hoskin, Robert.	20268	O'Neill, John A.	20325
Hough, Walter.	20235, 20450	O'Toole, George P.	19929
Hovender, Thomas.	20274	Paez, Don Ramon.	20388
James, S. H.	20514	Palmer, Edward.	20170, 20608
Jenks, J. W. P.	19589	Parke, C. A.	20534
Jensen, Lawrence.	20764	Parke, Edmund B.	20211
Johnson, J. B.	20312	Parrish, Stephen.	20270
Johnson, J. T.	20557	Parsons, Charles.	20300
Jouy, P. L.	19616, 20114, 20161	Peck, F. H.	20041
Kang, Chin-hi.	20254	Peffer, James H.	19648
Kappes, Alfred.	20276	Pennsylvania Railroad Company 19433, 20435, 20490, 20494, 20561, 20583, 20729, 20768, 20824	
Keppel, Frederick & Co.	20803	Perry, E. A.	19830
Kimmel & Voigt.	20297	Phoenix Glass Company.	20500
King, George C.	20512	Photo-Gravure Company.	20324
King Iron Bridge Mfg. Co.	20493	Prang, L., & Co.	20593, 20610, 20640
Klackner, C.	20288	Prang, Louis.	20286
Kloczewski, A. M.	19675	Preston, A. B.	19679
Koehler, S. R.	20293, 20302, 20469, 0587, 20604	Queen of Hawaii.	20085
Lang, John C.	20791	Quintin, Andrew.	20313
Lazier, Henry B.	19582	Raby, St. George R.	19972, 20194
Leon, Nicholas.	20119	Raby, St. George R., jr.	19973
Linton, W. J.	20260	"Railway Gazette"	20495
Lopor, W. H.	20487	Rau, Charles (deceased).	19931
Lowell, John A., & Co.	20293	Ravené, Gustave.	19663
Lukanitsch, M., jr.	20619	Reynolds, George D.	19688
Markland, A. H.	19432	Rice, William T.	19468, 19632
Martin, S. I.	20486	Rittenhouse, N. M.	20484
Mason, O. T.	20040, 20572	Ritter, S.	19856
Mather & Platt.	20531	Robeson, Mrs. George M.	20491
Maurer, Louis.	20275	Robinson, Miss Violet.	20385
McDonald, Angus.	20217, 20702	Rothfuchs, C. F.	20221
McLean, H. C.	19717	Royal Gardens, Kew.	20488
Meder, Ferdinand.	20804	Royle, John & Sons.	20625
Meigs, M. C.	20533	Ruggles, Daniel.	20381
Merchant, John E.	19367	Russell & Richardson.	20624
Metzel, Robert F.	20825	Russell, Charles W.	20063
Meyer, N.	19930	Ryan, Blake.	20045
Miller, Charles H.	20279		
Miller, D. A.	19605		

	Accession number.		Accession number.
Samson, Mrs. G. C.	19833	Technological Museum, New	
Sarony, Napoleon.	20289	South Wales.	20798
Schneider, Martin.	20081	Thornton, J. L.	19821
Schoff, Stephen Alonzo.	20280	Thorpe, Captain.	19655
Schwarz, G. A.	20319	Todd, E. R.	19726
Schraubstadter, Carl, jr.	20396	Tokio, Educational Museum.	19789
Scott, Alexander.	20216	Townsend, C. H.	19757
Scott, Thomas W.	20735	Trask, H. K.	20758
Seibert, S. R.	20769, 20781	Treasury Department; Bureau	
Sellers, John.	20661	of Engraving and Printing.	19556
Sessford, J. S.	20207	Treasury Department; United	
Sharp, George B.	20620	States Revenue Marine.	19774
Shirlaw, Walter.	20287	True, Mrs. F. W.	19740
Sickles, F. E.	20574	Vail, Stephen.	20318
Skinner & Sons.	20547	Van Ellen, K.	20282
Smillie, George H.	20296, 20355	Walden, Gilbert B.	19841, 20328
Smillie, James D.	20292, 20305	Walker, Charles A.	20290, 20592
Smillie, L. E.	20716	Wallace, John.	20823
Smith, C. K.	20154, 20642	Walters, J. W.	19940
Smith, Hugh M.	19804, 20006	War Department.	20209
Solar, Josué Smith.	20256	Warren Featherbone Company.	20091, 20548
State Department.	19818	Watkins, J. E.	20222, 20386
Stevens Institute of Technology.	20162, 20760, 20797	Welling, James C.	20402
Stearns, R. E. C.	20582	Whitney, E. J.	20800
Stuart, Edwin S.	20820	Widdowson, J. W.	20745
Stevens, Robert.	19888	Wilkinson, Ernest.	19991
St. Gaudens, Augustus.	20084	Wilson, John & Son.	20589
Strait, N. A.	20319	Wilson, John M.	19947
Stuart, F. T.	20291	Wilson, Thomas.	19530, 20061, 20393, 20539, 20626
Stubbs, W. P.	20777	Withers, E. F.	20044, 20163
Sturtevant, E. Lewis.	20029	Woltz, G. W.	19578, 19815
Swarr, D. M.	20504	Wood, Joseph.	20428
Swett, Frederick K.	19756	Worth, S. G.	19390, 19780
Swift, William.	19612	Wunderlich, H., & Co.	20802
Tastet, W. M.	20219		

DEPARTMENT II.

(A) ETHNOLOGY.

Abbott, W. H.	20088	Cooper, W. B.	20771
Adler, Cyrus.	19969	Crawford, A.	20826
Allen, H. T.	19372	Creel, H. M.	20615
Allen, J. Isham.	20493	Doane, W. H.	20647
Bartlett, Edward.	20093	Fleming, J.	19701, 19819
Bayard, Thomas F.	20315	Ferguson, T. E.	19936
Blue, L.	19634	Goode, G. Brown.	20368, 20757
Boas, Franz.	19425, 19597	Goward, Gustav.	19374
Bolles, T. Dix.	19429, 19793, 20443	Grant-Bey, James.	19747, 20440
Bureau of Ethnology.	19373	Greey, E.	21176
Burger, Peter.	20727	Hartleben, C. A. von.	19964
California Academy of Sciences.	19531	Hazen, Mrs. Mildred McLean.	20458
Colburn, G. F. I.	19486	Howarth, Elijah.	20401

	Accession number.		Accession number.
Hyde, George Byron.....	19708	Rich, Shebnah	20563
Jaggers, J. A	19867	Ridgway, Robert	19370
John, Andrew, jr	20224	Robeson, Mrs. George M	20537
Jouy, P. L	19537, 19633, 19792, 19825	Shufeldt, R. W	19540
Kunz, George F	20083	Skidmore, P. H	19493
Lang, John C	20774, 20791	Smith, Francis B	20703
Lipscomb, A. A	20628	Smith, Hugh M	19724
Lovett, Edward	20116	Solar, Josué Smith	20256
Mason, O. T	20465	Stearns, R. E. C	19941
Maspero, G	20421	Swan, James G	19477
Mathers, G. M	20566	Sweeny, T. W	19619
Matthews, W	20077	Taliaferro, Susan	20164
McBean, Mrs. Anna C	20048	Taunt, E. H	20681
Military Academy, United States	19685	Thompson, R. J	19636
Musée d'Histoire Naturelle	19396	Thomson, William J	20078, 20511
Myers, W. H	19635	Tokio Educational Museum	19478
Palmer, Edward	20605	Townsend, Charles H	19811
Parke, Davis & Co	19610, 19712	Trocadero Museum	19985
Patrick, L. S	20350	Van Doren, W. T	19423, 19745
Pavy, Mrs. Lillie May	20614, 20793	Whitten, W. A	20377
Peffer, James H	19720	Wilson, Thomas	19851, 19920, 20699
Phillips, Barnet	20567	Woltz, Wilham	20397
Randall, A. Frank	20263	Woolbridge, J	19436
Ransom, William	20668	Wynan, Edward	20529
Ravené, Gustave	19645		

(B) PREHISTORIC AMERICAN POTTERY.

Batchelor, Ward	19376	Fleming, J	19701
Davidson, W. M	20725	McCormick, Mrs. S. C	19714
Gilliland, A. L	19392	McNiel, J. A	19699
Hakes, W. A	20521	Palmer, William	19639

DEPARTMENT III.

PREHISTORIC ANTHROPOLOGY.

Abbott, W. H	20055	Davis, Howard B	20210
Adams, W. H	20177, 20481	Dodge, Wallace H	19706
Adams, W. W	19506, 20248, 20456	Drake, J. N	19606
Alfaro, Anastasio	20096	Dyche, D. T. D	20174
Beach, H	20171	Elliott, F. O	20506
Bell, Carey	20413	Ellsworth, E. W	20179
Benedict, A. L	20365	Emons, C. T	19820, 20482
Black, E. C	20178	Faris, Lafayette	19771
Bodecker, J. K	20551	Faucher, G. L	19852
Bowers, T. B	19631	Freshwater, J	20189
Bureau of Ethnology	19465, 20349	Frost, L. L	20462
Burns, W. R	19627, 19834, 20027	Gamage, A. T	20251
Carpenter, W. L	19759, 19808	Gere, J. E	20653
Coe, Henry W	20253	Gerner, J. M. M	20191
Crawford, Marion	20252	Green, G. K	20362, 20633
Daniels, George F	20546	Hamlin, R. H	19427
Davenport Academy of Sciences	20751	Hampton, W. C	19461

	Accession number.		Accession number.
Hanna, H. W.....	20180, 20717	Sheldon, W. H.....	20807
Haywood, Howard.....	20357	Shoemaker, Ernest.....	20175
Hill, W. S.....	19484, 19826	Shriver, Howard.....	20182
Jackson, E. E.....	19413	Smith, C. K.....	20434, 20642
Jefferson, Mary Eliza.....	19399	Sisk, C. T.....	19387
Knowlton, F. H.....	19395	Skinner, B. D.....	20238
Knowlton, James E.....	20612	Steele, Robert J.....	20359
Kummerfield, J. F.....	19510	Steinmeyer, F. A.....	20634
Lemon, John H.....	19386	Stephenson, J. A. D.....	20183, 20479
Lovett, Edward.....	20116, 20225	Stevenson, J. A.....	20371
MacLean, J. P.....	19994	Stratton, C. L.....	20240
Mason, O. T.....	19998	Stroebel, L. H.....	19415
McCormick, J. C.....	19435, 19474	Taubner, Charles.....	20329
McCormick, Mrs. Sarah C.....	19714	Thompson, Charles A.....	20353, 20471
Mercer, R. W.....	19625, 20556	Tooker, William Wallace.....	20418
Moorehead, Warren K.....	20148, 20330, 20689	Townsend, Charles H.....	19811
Newlon, W. S.....	20181, 20460, 20581	Turner, Charles J.....	20660
Nissley, J. R.....	20345	Tweed, J. W.....	19499, 19587, 19696, 19801,
Null, James M.....	20545		20629
Nye, Willard, Jr.....	20480, 20579	Upham, E. P.....	19491
Ober, Andrew K.....	19968	Veach, N. T.....	19770
Page, W. L.....	19402	Ward, Joseph.....	20470
Palmer, Edward.....	20608	Warfield, J. W.....	19952
Palmer, J. S.....	19475	Way, Nathaniel.....	19862, 20185, 20507
Payne, Alvan.....	19669	Webster, George A.....	19473
Peabody Academy of Sciences ..	20159	Wetherell, Frank E.....	20669
Perkins, G. H.....	20554, 20734	Williams, H. F.....	20354
Proudfit, S. V.....	20003, 20358	Willis, Merritt.....	20331
Rau, Charles (deceased).....	19931	Wilson, L. D.....	19741
Reynolds, E. R.....	20497	Wilson, Thomas.....	20019, 20034
Richmond, A. G.....	20784	Wiltheiss, C. T.....	20311
Roulet, F.....	20688	Wright, James C.....	20550
Ruggles, Charles.....	20208, 20420	Yeates, Jesse J.....	20160
Sawyer, C. M.....	19946, 20046	Zeledon, José C.....	19796
Sharpless, A.....	20158, 20429, 20603		

DEPARTMENT IV.

MAMMALS.

Babcock, E. C.....	19450, 19595	Dugès, A.....	20097
Barclay, E. D.....	20193	Eaton, J. M. C.....	19466
Bartlett, J. R.....	19371	Fish Commission, United States.....	19588,
Bean, T. H.....	19659		20637, 20640
Bolles, T. Dix.....	19700	French & Kinney.....	20655
Bowen, Amasa.....	20473	Gardner, P.....	19932
Brooks, P. H.....	19574	Goode, G. Brown.....	20580
Brown, J. W.....	20714	Hessel, R.....	20455
Carpenter, W. L.....	19808	Hornaday, William T.....	19880, 20042
Central Park Menagerie.....	20010	Hoy, P. R.....	20094
Cockerell, Theodore D. A.....	19697	Indiana State University.....	19889
Demonet, Mme. & Son.....	19365	Knudsen, Valdemar.....	20560
Douglass, A. B.....	20015	Lang, John C.....	20791

	Accession number.		Accession number.
Machenheimer, G. L.	20245	Sellner, J. J.	20742
Mather, Fred.	19767	Shufeldt, R. W.	19401, 19802
Merriam, C. Hart.	20630	Simmons, George C.	19509
Merrill, J. C.	19748, 19752	Stephens, F.	19381, 19462
Miller, Alexander McVeigh.	20713	Townsend, Charles H.	19715, 19811, 20787
Owsley, W. T.	20648	Ward, Henry A.	19935, 20645
Piper, Miss Tillie.	19504	Worthen, Charles K.	20538, 20693
Pollock, G. F.	20611	Zoological Society of Philadel- phia.	19430, 19598, 19621, 19848, 19892, 20064
Rickards, T. M.	20577		
Rovirosa, José N.	20463		
Ryerson, J. H.	19665		

DEPARTMENT V.

(A) BIRDS.

Aiken, C. E.	19471	Forbush, E. H.	20576
American Museum of Natural History.	19611, 19773, 20363	Fox, W. H.	19668, 19704
Avery, William C.	20671, 20732	Gale, Dennis.	19970
Barnum, M. K.	19527, 20412	Gant, A.	19657
Bartlett, Edward.	20093	Goode, G. Brown.	19568
Bean, T. H.	19659, 20750	Goss, N. S.	19389, 20540
Beckham, C. W.	19440, 19997	Greenwood, E. C.	20104
Benners, G. B.	19732	Havners, W. H.	19449, 19579
Benson, H. C.	19363	Hawley, E. H.	20442
Bergen Museum.	20468	Henson, Harry V.	19405
Beverly, J. B.	20190	Hessel, Rudolph.	20230
Boardman, George A.	19995	Jackson, Thomas H.	19900
Boston Society of Natural His- tory.	19361, 19451, 19584, 19599, 19662	Jacobs, Elmer T.	20347
Brenniger, G. F.	19447	Jeffries, J. Armory.	20436
Brewster, Miss.	20334	Jouy, P. L.	19813, 20114, 20220
Brewster, William.	19417, 19909, 19944, 20039, 20788	Kerr, D. C.	20437
Bridgman, A., jr.	20663	Knudsen, Valdemar.	20560
Brooks, P. H.	19574	Lawrence, George N.	20782
Bryant, Walter E.	19927	Machenheimer, G. L.	20400
Butler, Amos W.	20151, 20438, 20618	Marshall, George.	19664, 19686, 19690, 20173
Carpenter, W. L.	19808	Marshall, Henry.	19552, 20056, 19652, 20335
Chadbourne, A. P.	20035	Mather, Fred.	20364
Chamberlain, C. W.	20146	McCormick, J. C.	19545
Cherrie, George K.	20314	McCormick, Mrs. Sarah C.	19714
Coale, H. K.	19393	McIlwraith, F.	20515
Cory, Charles B.	19360, 19674, 19838, 19839, 19926	Meigs, M.	20662
Denton, S. W.	20786	Merriam, C. Hart.	19422, 19651, 19781, 20152, 20729, 20749,
Dresser, H. E.	19971	Muller, August.	19955
Dugès, A.	20097	Museum Nacional, de Costa Rica.	19798
Fish Commission, United States.	19588, 19908, 19910, 19942, 19945, 19954, 20125, 20131, 20232, 20257, 20317, 20405, 20414, 20517, 20643, 20673	Museum of Comparative Zoology, Cambridge, Mass.	19731, 20074, 20172
Fisher, A. K.	19863, 20432	Nehrkorn, A.	19980
		Nye, Willard, jr.	19989
		Palmer, William.	19643, 19676, 19763, 20607
		Poling, O. C.	20092
		Price, W. W.	19840, 20306, 20743
		Ragsdale, G. H.	20439

	Accession number.		Accession number.
Rice, Moses	19799	Stavanger Museum	19458
Richardson, W. G.	20656	Stephens, F.	19381
Richmond, Charles W.	19943, 20310	Tassin, A. G.	19698, 19707, 19730
Ridgway, Joseph H.	20229	Taylor, Willie	19420
Ridgway, Robert. 19406, 19503, 19551, 19559		Thompson, E. E.	19383, 19933, 20792
Riker, C. B.	19523, 19600, 19768	Townsend, C. H.	19715, 19811
Roberts, W. T.	19681	Tokio Educational Museum.	19478
Robeson, Mrs. George M.	20491	Toppa, George L.	20348
Rovirosa, José N.	20463	Wakefield, M.	19996
Rowland, Thomas.	20794	Warren, B. H.	20403, 20602, 20808
Schmid, Louis, & Sons. 19421, 19576, 20118		Welster, Mrs. M. H.	19682
Schneck, J.	20051	Wilcox, T. E.	20101
Seeborn, Henry	19448, 20327	Wilson, F. B.	20569
Sennett, George B. 19356, 19739, 19846, 19934		Zeledon, José C.	19536, 20809
Schufeldt, R. W.	19776	Zellar, Conrad.	20233, 20783
Skiuner, T. E.	19472	Zeller, Fred	20057
Smith, H. G.	20001, 20776	Zoological Society of Philadel- phia.	19481, 19577, 19598, 19649, 19791, 20564
Smith, O. C.	20326		
Stabler, Harold D.	20236		

(B) BIRDS' EGGS.

Avery, William C.	20477, 20559, 20598, 20616, 20658, 20696	Merriam, C. Hart.	20552
Bartlett, Edward	20693	Merrill, J. C.	19384, 19469
Benson, H. C.	19352, 19363, 19488	McCormick, Mrs. Sarah C.	19714
Brown, Herbert. 20478, 20541, 20683, 206.5, 20708		McLaughlin, R. B.	19400
Carpenter, W. L.	19808	Mitchell, Guy E.	20772
Clark, John N.	19382	Morrison, Charles F.	19958
Fish Commission, United States. 19426, 19588		Palmer, Edward.	20608
Fisher, A. K.	19758	Preston, J. W.	20585
Gale, Dennis.	19970	Richmond, Charles W. 19394, 19736, 19891	
Goss, N. S.	20540	Ridgway, Robert.	19551, 19559
Hall, Charles.	19549	Shellack, E. H.	20678
Jackson, Thomas H.	19950	Shick, Charles S.	20755
Jamison, H. K.	19974	Smith, Hugh M.	19456, 19485
Lawrence, George N.	19412	Stephens, F.	19381
Lywood, W.	20766	Taylor, Zach.	20657
Mather, Fred.	20204	Townsend, Charles H.	19811
		Tromsoe, M. Fostic.	20136
		Zeledon, José C.	19796

DEPARTMENT VI.

REPTILES.

Acevedo, José.	19703	Carpenter, W. L.	19670, 19808
Bayer, W. H. von.	19620, 20674	Central Park Menagerie.	19476
Beachler, Charles S.	20255	Cockerell, Theodore D. A.	20075
Bean, T. H.	19453	Cory, C. B.	19362
Bell, James	20102	Dugès, A.	20097
Benson, Harry C.	19452	Edwards, Vinal N.	19727
Brown, Herbert.	20478	Ellis, Charles Roland.	20765
Brown, S. G.	20731	Fish Commission, United States. 20008	
Burns, W. C.	20780	Forrister, George B.	19928
Call, R. Ellsworth.	19517	Hamilton, M.	20573

	Accession number.		Accession number.
Herron, Charles S	20748	Quinn, W. M.	21002
Hood, H. D	19355	Robinson, Conway, jr.	19489
Hurter, Julius	19965	Sewell, J. A.	19614
Lewis, Willis	20555	Shutt, George W.	19490
Long, W. B.	19956	Stearns, R. E. C.	19-87
MacRae, Donald	19705	Toppan, C.	20676
Merrill, J. C.	19748	Townsend, Charles H.	19811
Owen, W. O., jr.	19357	Webb, John S.	20806
Palmer, William	20763	Zoological Society of Philadel- phia	19572
Park, E. H.	20316		

DEPARTMENT VII.

FISHES.

American Angler	19709	Jordan, D. S.	19979, 20145
Beacom, J. H.	20072	Kauffmann, Rudolph	20571
Bean, T. H.	19659	Knowles, Herbert M.	19590, 19633
Blackford, E. G.	19666, 19733, 19766	Magoun, George C.	19783
Bunting, W. S.	19661	Marshall, George	20451
Call, R. Ellsworth	19517	McCormick, Mrs. Sarah C.	19714
Carpenter, W. L.	19-803	Merrill, J. C.	19748
Chubb, Thomas H.	19437	Middleton, J.	19-812
Church, Joseph & Co.	19-54	Mowat, Thomas	19593, 20382
Cockerell, Theodore D. A.	19697	Pierce, H. D.	20568
Delaney, Patrick	19901	Quackenbos, John D.	19853
Dugès, A.	20097	Sawtell, Gilman	19803
Fish Commission, United States	19588,	Stearns, R. E. C.	20697
19640, 19653, 19713, 19727, 19-93, 19948,		Steelman, Thomas	19857
19984, 20008, 20079, 20125, 20257, 20659		Tanner, Z. L.	19397
Gilbert, Charles H.	20670	Thompson, Thomas	19784
Golden, R. A.	20724	Thorpe, H. H.	19507
Gramm, Otto	19650	Townsend, Charles H.	19811
Grebinitzky, N.	20086	Ward, Henry A.	19424
Green, J. A.	20198	Weaver, C. A., & Co.	19977
Harris, Theodore S.	19408	Whitehead, W. T.	20433
Hicks, Thomas R.	19573	Willoughby, Charles	19957
Hodge, E. B.	19893, 20018		

DEPARTMENT VIII.

VERTEBRATE FOSSILS.

Bartlett, Edward	20093	Koehler, S. R.	20417
Interior, Dept. of the, U. S. Geo- logical Survey	19554, 20733		

DEPARTMENT IX.

MOLLUSKS.

Acker, H. P.	20361	Bastow, I. W.	19785
Albany Museum	19959	Bean, T. H.	19659
Aldrich, T. H.	19855	Bolles, T. Dix.	19700
Bartlett, Edward	20093	Call, R. Ellsworth	19351, 19710

	Accession number.		Accession number.
Church, Joseph & Co.....	1954	Lea, Isaac (deceased).....	20525
Cockerell, Theodore D. A.....	19697, 20075	McAllister, Joseph.....	19439
Dall, W. H.....	20723	McCormick, Mrs. Sarah C.....	19714
Dugès, A.....	20097	Merrill, J. C.....	19748
Duly, A. A.....	20231	Moore, C. R.....	20467
Drew, S. H.....	19580	Orcutt, C. R.....	20721
Everett, Mrs. J. H.....	20476	Rush, W. H.....	19518
Fish Commission, United States.....	19588, 20000	Simpson, Charles T.....	20073, 20722
Goldfuss, Otto.....	20372	Singley, J. A.....	19694, 19790
Grebnitzky, N.....	20086	Sisk, C. T.....	19387
Harris, Theodore S.....	19408	Smith, Hugh M.....	19693
Hemphill, Henry.....	20166, 20543, 20739	Stearns, R. E. C.....	20260, 20720
Hough, Walter.....	20459	Wesleyan University.....	19680
Indiana State University.....	19889	Westgate, William Walter.....	20122
Interior, Dept. of the, U. S. Geo- logical Survey.....	19911, 19976	Willcox, Joseph.....	20710
Keach, M. A.....	19761	Wright, B. H.....	19532, 19765
		Zoological Society of Philadelphia	20113

DEPARTMENT X.

INSECTS.

Bartlett, Edward.....	20093	Lemon, John H.....	19658
Bates, C. P.....	20790	McAllister, Joseph.....	19439
Beers, Anthony.....	19560	McCrory, J. A.....	20530
Bollman, C. H.....	20155	Merrill, J. C.....	19748
Brown, J. T.....	19520	Mills, Robert A.....	19487
Cockerell, Theo. D. A. 19697, 19861,	20075	Noah, John M.....	19684
Colton, O. B.....	20447	O'Malley, Mr.....	20601
Coquillett, D. W.....	20336	Purnell, J. H.....	20457
Cunningham, Howard C.....	19895	Row, A. M.....	20741
Denham, Charles S.....	19513	Rutherford, Horace.....	19585
Devenger, George W.....	20562	Sandos, W. A.....	19671, 19962
Drake, Mrs. James H.....	19529	Schoenborn, H. F.....	19565
Dugès, A.....	20097	Schwarz, E. A.....	19535, 20639
Eaton, J. M. C.....	19501	Shields, Charles O.....	19444
Eberle, Eugene E.....	20176	Smith, T. W.....	19508
Ellis, L. H.....	20522	Todd, E. R.....	20028
Estes, E. D.....	19366	Townsend, C. H.....	19811
Fish Commission, United States.....	20000, 20008	Turner, G. K.....	20510
Godman, T. D.....	20007	Tyree, J. S.....	19416
Heaton, L. D.....	19539	Underwood, L. M. 19526, 19533, 19542,	19751
Holbert, J. C.....	20022	Wehrle, R. W.....	19409
Illinois State Laboratory of Nat- ural History.....	20395	White, I. C.....	19566
King, John.....	20652	Whiteside, J. M.....	19899
		Williston, S. W.....	19702
		Wooster, A. F.....	19492

DEPARTMENT XI.

MARINE INVERTEBRATES.

Allen, J. Isham.....	20493	Brickell, Miss A. A.....	20374
Bean, T. H.....	19659	Burns, Frank.....	20690
Blackford, E. G.....	20449	Call, R. Ellsworth.....	19710

	Accession number.		Accession number.
Carpenter, P. Herbert	20483	Lea, Isaac (deceased).....	20525
Chubb, Thomas H.....	19844	Marshall, John.....	19795
Dugès, A.....	20097	Martin, S. J.....	20730
Fish Commission, United States.	19588,	Merrill, J. C.....	19748
19653, 19659, 19727, 20000,		Nicholson, L. A.....	20785
20008, 20079, 20125, 20257		Palmer, Edward.....	20608
Grebritzky, N.....	20086	Wilcox, W. A.....	19807, 20123
Hemphill, Henry.....	20543	Willard, George L.....	20309
Jacobs, S. M.....	19806	Worth, S. G.....	19692

DEPARTMENT XII.

COMPARATIVE ANATOMY.

Bosworth, G. L.....	19842	McCormick, Mrs. Sarah C.....	19714
Burns, W. R.....	19627	McFall, D. M.....	19567
Cambridge University.....	19673	Miller, Stowe, and Freeman..	19672, 19683
De La Mater, L. M.....	20370	Myers, John.....	19445
Dugès, A.....	20097	Page, Nelson C.....	20154
Fish Commission, United States.	19588	Robeson, Mrs. George M.....	20491
Foster, Mrs. Mary F.....	19558	Shufeldt, R. W.....	19719, 20595
Fry, F. G.....	20532	Stabler, James P.....	19591, 19624
Gerrard, Edward.....	20677	Tate, E. O.....	19881
Gould, A. L.....	19809	Todd, E. R.....	20575
Grebritzky, N.....	20086	Townsend, Charles H.....	19811
Herron, Charles S.....	20431	True, F. W.....	19482
Hickok, Frank.....	19515	Tullberg, Tycho.....	19454
Interior, Department of the, U.		Ward, Henry A.....	20099
S. Geological Survey.....	20789	Whitman, W. J.....	20644
Jouy, P. L.....	20150	Worth, S. G.....	19692
Lucas, F. A.....	20009	Yale College.....	20448
Lusk, F. C.....	20369	Zoological Society of Philadel-	
Marron, Augustus.....	19647	phia.....	19407, 19618, 19621
Mather, Fred.....	20132, 20234		

DEPARTMENT XIII.

(A) INVERTEBRATE FOSSILS (PALEOZOIC).

Bayless, W. C.....	20352	Gere, J. E.....	20653
Beachler, Charles S.....	20692	Indiana State University.....	19889
Beecher, C. E.....	19823	Interior, Department of the, U. S.	
Beunett, L. J.....	19949	Geological Survey.....	19845, 20409
Burns, W. R.....	19627	Knowlton, F. H.....	19395
Call, R. Ellsworth.....	19710	Lea, Isaac (deceased).....	20525
Coffy, John.....	20392	McCarty, W. T.....	19859
Collett, John.....	19983	McCormick, Mrs. Sarah C.....	19714
Cummings, W. F.....	19858	Newlon, W. S.....	19896
Fish Commission, United States.	19588	Stewart, John T.....	20746
Geological and Natural History		Tweed, J. W.....	20629
Survey of Canada.....	19951		

(B) INVERTEBRATE FOSSILS (MESOZOIC).

	Accession number.		Accession number.
Indiana State University	19889	Lea, Isaac (deceased)	20525
Interior, Department of the, U. S. Geological Survey	19555	Ragsdale, G. H	19990
Koehler, S. R	20417	Stearns, R. E. C	20697

(C) INVERTEBRATE FOSSILS (CENOZOIC).

Aldrich, T. H	19695	Taylor, W. Edgar	19644
Stearns, R. E. C	20260		

DEPARTMENT XIV.

FOSSIL PLANTS.

Aldrich, H. L	20407	MacDonald, A. C	20375
Cilley, Tristram	19827	Nagle, Harry	19822
Herzer, H	20261	Pringle, C. G	20430
Hine, L. G	19923	Russell, I. C	20262
Hornaday, William T	20188	Williams, H. C	20340
Lyon, Hall & Co	20503		

DEPARTMENT XV.

RECENT PLANTS.

Bathey, Charles	19494	Oerlein, R	19835
Cockcroft, J. M	19521	Palmer, Edward	20608
Cockerell, Theo. D. A	19697	Pratt, W. H	20228
Devereaux, J	19687	Price, T. S	19446
Dugès, A	20097	Reardon, William	20634
Eagle, H. M	19502	Rodman, James	19543
Eckfeldt, J. W	19744	Rovirosa, José N	20463, 20691, 20756
Fish Commission, United States	19588	Schuette, J. H	19637, 20419
Frasier, S. S	20087	Sharpless, S. P	20115, 20149
Grinnan, A. G	19656	Shufeldt, R. W	19615
Harrison, S. R	20767	Smith, J. W. C	20600
Henshaw, H. W	19762	Stearns, R. E. C	20697
Hunter, William	20706	Sturtevant, E. Lewis	20106, 20153
Knowlton, F. H	19395	Sultan of Sambas	20638
McCarthy, Gerald	19729, 20687	Toner, J. M	20695
McCormick, J. C	19464, 19548	Townsend, Charles H	19811
McGlumphy, G. W	20617	Van Doren, W. T	19423
Morris, Scott	20165	Watson, Sereno	19868
Mueller, Ferdinand von	20360	Wood, F. E	19886

DEPARTMENT XVI.

MINERALS.

Aldrich, Charles	19725	Barker, James M	19353
Allen, J. Isham	20493	Bartholomew, W. G	20332
Auik, H. J	19519	Beath, James W	20818
Australian Museum	20773	Beck, W. H	20139

	Accession number.		Accession number.
Bement, C. S.....	20066	Leary, J. L	19937
Bensal, R. A.....	20004	Lienan, D. B.....	20711
Bessels, Emil.....	20121	Lincoln, O	20036
Bidwell, Mrs. C. A.....	20489	Martin, L. S	19641
Bolton, H. Carrington.....	20043	McAlpine, J. B.....	19354
Boyle, C. B.....	20138	McCormick, J. C	19545
Brazil, National Museum of.....	20192	McCormick, Mrs. Sarah C	19714
British Museum.....	19915	McDonald, Mr.....	20337
Brown, W. Q.....	20303	McDonald, A. W	20549
Bumpus, L. I.....	19463	McElhone, James F	19778
Burns, Frank.....	20631	Meehlin, A. H.....	20227
Butler, F. H	19885, 20817	Merrill, George P.....	19553
Byrne.....	20069	Metche, Otto.....	20667
California State Mining Bureau.....	19497, 20321	Miller, Charles.....	19596
California State Mining School..	20203	Miller, John.....	20366
Carr, W. B.....	20065	Miner, S	19512
Colson, James M., jr	19721	Monroe, R. W.....	20258
Combs, J.....	19541, 20013	Morrison, James H.....	20544
Conant, Ambrose.....	19391	Mullins, William J.....	20307
Conrad, L.....	19960	Nelson, S. J.....	19442
Cunningham, C. W.....	20339	Netherlands Government	19913
Davis, H. J	19350	New England Mining Company.....	19786
Day, D. T.....	19902	Olmstead, E. S	20014
Denham, Jennie L	19728	Peale, A. C.....	19919
Diller, J. S.....	20206	Pearce, Richard.....	20167
Dix, Miss D. L	19890	Penfield, S. L	20415
Doan, C. F.....	20005	Perry, N. H.....	20215, 20338
Duly, A. A	20071	Price, Thomas	19617, 20606
Dunnington, F. P	20105	Readwin, T. A.....	19743
English, G. L. & Co.....	20815	Reynolds, A. D.....	19742
Fischer, Henri A.....	20404	Rice, William North.....	20100
Fletcher, Robert	20080	Riley, C. V.....	20384
Foote, A. E	20516	Rouse, C. W.....	19443
French, Clarence E.....	20682	Salomon, Fred	20349
Garner, R. L	19907	Scott, Samuel.....	19843, 20498
Goode, G. Brown.....	20197	Seckler, L. W.....	19562
Gregory, J. R	19918	Shah of Persia.....	20378
Hampton, W. C.....	19461	Sharpless, S. P.....	20137
Hanks, Henry G	20068	Shepard, C. U.....	20026
Helton, W. E.....	19534	Siemaschk, J. von.....	19988
Henson, Samuel.....	19883	Smith, E. A.....	20037
Hidden, W. E.....	19787, 20157	Smith, S. W	20017, 20095, 20830
Hockhaus, F. W.....	19428	Smith, W. B.....	20067
Hyatt, P. F.....	20701	Snider, Mrs. A. B	19963
Interior, Department of the, U. S.		Spear, George B.....	20058
Geological Survey.....	19911, 20156	Stearns, R. E. C.....	20260
James, Charles P.....	20513	Stephenson, Chauncey.....	19764
Knight, W. C.....	19550	Stevenson, James	20416
Kunz, George F.....	19805, 19916, 20308	Stufflebeam, J. G.....	19457, 19570
Lamb, J. E	20665	Taylor, J. L.....	20553
Lange, Charles T.....	19723	Tiffany & Co.....	20816
Lattin, Frank H	19903	Tokio Educational Museum.....	19914
Lea, Isaac (deceased).....	20423	Turner, W. C	19480
		Utah Salt Co.....	19814

	Accession number.		Accession number.
Van Doren, W. T.....	19423	White, C. S.....	19938
Vilas, J. C.....	19882	Whitmore, George C.....	19470
Ward & Howell.....	19917, 20187	Wright, D. W. M.....	20359
Ward, James A.....	19738	Young, James A.....	19431
White, C. A.....	20038		

DEPARTMENT XVII.

LITHOLOGY AND PHYSICAL GEOLOGY.

Allen J. Isham.....	20493	Medford, Harvey C.....	20726
Australian Museum.....	20773	Mercia, F. M.....	19500
Baker, J. U.....	19829	Merrill, George P 19388, 19511, 19514, 19516, 19546, 19553, 19581, 19592, 19594,	19775
Barnes, W. J.....	20024	Merrill, L. H.....	20427
Baxter, R. L.....	20485	Nutting, C. C.....	20528
Blow, William N.....	20424	Page, R. W.....	19563
Burns, Frank.....	20651	Palmer, Edward.....	20608
Church, Joseph & Co.....	19836	Payne, Alvan S.....	19669
Cooper, W. F.....	19760	Peale, A. C.....	20195
Corrine, Leverett.....	20675	Pendleton, J. C.....	20425
Crosby, W. O.....	19528, 19750	Pike, A. F. Mfg., Co.....	19364
Diller, J. S.....	20367	Ragsdale, G. H.....	19990
Duly, A. A.....	19860, 20594	Richards, Charles N.....	19603
Easterday, William D.....	20134	Richardson, C. B.....	20346
Fish Commission, United States.....	19588, 20120	Rinker, Josiah.....	20542
Folsom, J. W.....	19434	Russell, I. C.....	20570
Forrestell, James.....	20186	Schreiber, W. A. H.....	19722
Fritsch, E.....	19678	Shepard, James.....	19711
Garrison, H. S.....	20133	Sisk, C. T.....	19387
Hampson, Thomas.....	20110	Southern Const. and Quarry Com- pany.....	19788
Harris, T. C.....	19524	Spooner, E. H.....	19975
Hay C. D.....	19677	Stearns, R. E. C.....	20260
Hitchcock, C. H.....	19999	Stine, Andrew J.....	20214
Hobbs, W. H.....	20700	Thorpe, Russell.....	20082
Interior, Dept. of the, U. S. Geo- logical Survey 19845, 19849, 20047, 20156		Van Doren, W. T.....	19423
Jack, W. H.....	20394	Wallis, J. G.....	19609
Jeffers, Isaac S.....	19564	Wanner, A.....	20023
Kemp, J. F.....	19987	Watkins, G. W.....	20599
Kilham, L. C.....	20518	Werderman, C.....	19483
King, F. G.....	20406, 20520	Werth, J. W.....	20536
Knowlton, F. H.....	19395	Wilcox, A. C.....	20380
Kunz, George F.....	19805, 19986	Wilson, James H.....	20124
Lamb, T. S.....	19749	Winston, Isaac.....	20410
Linehan, P., & Co.....	19359, 19404	Worth, R. N.....	19358, 20383
Luce, Israel.....	20422	Zeng, Henry L. de.....	19544, 19630

DEPARTMENT XVIII.

METALLURGY.

Adams, Charles H.....	20117	Australian Museum.....	20773
Agnew, John P.....	19800	Ballou, E.....	20241
Allen, J. Isham.....	20493	Barker, George F.....	19441
Asbestos Packing Company.....	20199	Beatty, J. C.....	20502

	Accession number.		Accession number.
Beckwith, George H.....	20709	Knowlton, F. H.....	19395
Berry, James H.....	19419	Lane, Sylvanus.....	19538
Bond, W. R.....	20033	Leary, J. L.....	20672
Bordine, J. H.....	19746	Leggart, L. H.....	19505
Brown, C. G.....	19939	Luther, W. N.....	20747
Brunton & Taylor.....	19691	Maynard, G. W.....	19575
Burchart & Co.....	19385	Maynard, William D.....	19884
Burns, Frank.....	19832	McElhone, James F.....	19623
Butler, E. J.....	20012	McGuire, John.....	20373
Butler, R. R.....	20390	McLean, F. P.....	20376, 20565
Carey, Mrs. Mattie Ward.....	19522	McRae, Thomas C.....	19602
Carlin, William P.....	19966	Morgan, J. T.....	19375, 19660
Carlisle, N. F.....	20744	Mort, E. W.....	19410
Case, R. W.....	20712	Mosman, John.....	19828
Chatard, T. M.....	19755	Moyer, Henry C.....	19837
Chatfield, Silas.....	19418	Myers, Peter.....	20578
Clark, G. H.....	20492	Nelson, Christian.....	20505
Coffin, C. E.....	20002	Newman, G. J. R.....	19912, 20351
Colhouer, E. H.....	19561	O'Connell, E. Doroghtery.....	19459
Collett, R. H.....	20250	Payne, Alvan S.....	19669
Colorado Smelting Company.....	20021	Quicksilver Mining Company....	20762
Conrad, L.....	19906	Reynolds, A. D.....	19583
Cotman, A. J.....	19398	Riley, C. V.....	20384
Crowkhite, A. H.....	19667	Sawyer, J. G.....	19922
Curtis, Patrick.....	19438	Schreiber, W. A. H.....	19455, 19817, 19824, 20011
Du Pré, D. A.....	19586	Scott, Hamilton.....	19571
Fish Commission, United States.	19588	Standard Charcoal Company ...	19978
Freeman, F. L.....	20452	Stearns, R. E. C.....	20260
Galvin, Charles D.....	20032	Tarvin, William F.....	19557
Gawthorp, J. E.....	20501	Tucker, Milton T.....	19769, 19924
Godman, M. M.....	19735	Turner, J. S.....	20527
Green, Loren W.....	20322	Walker, J. P.....	20246
Green, W. E.....	19403	Warren, J. H.....	20499
Hadfield, Robert.....	19905	Whitcomb, O.....	20167
Harrison, V. T.....	19850, 19897	White, G. W.....	19525
Hepner, J. H.....	20112	Whitlach, Jacob.....	20426
Huddleson, George.....	20333	Wier, J. D.....	19992
Interior, Department of the, U. S.		Wilson, W. L.....	20016
Geological Survey.....	20156	Windsor, D. A.....	19460
Jones, T. D.....	19810	Wise, F. A.....	19414
Keeling, W. S.....	19479	Worth, S. J.....	19737
Kercheval, Andrew.....	19753		

DEPARTMENT XIX.

LIVING ANIMALS.

Allen, R. T.....	20679	Brown, J. E.....	19875
Anderson, W. S.....	20752	Cleveland, Hon. Grover.....	20050
Blackford, E. G.....	20586	Cockran, A. W.....	20111
Boggs, J. O.....	20054	Colt's Pat. Fire Arms Mfg Co..	20814
Boswell, R. H.....	20127	Coumbe, Eppa Hunton.....	20201
Boulding, George.....	20212	Davis, O. V.....	19869
Brown, George E.....	20060	Ellis, J. Frank.....	19866

	Accession number.		Accession number.
Eustis, Mrs. J. B.....	20778	Ohm, Fredrick C.....	19874
Fish Commission, United States.	19873,	Ostrander, T. L.....	20718
	19925, 20737	Owsley, W. T.....	20466, 20649, 20740
Fisher, A. K.....	20169	Palmer, Joseph.....	20052, 20343
Ford, Frank.....	20453	Petit & Dripps.....	20753
Gant, Charles B.....	20259	Pollock, George F.....	20636
Gay, C. A.....	19878	Ray, Alfred.....	20654
Gedz, August.....	20098	Reed, John.....	20775
Glennan, P.....	20464	Riddle, J. W.....	20076
Hamlin, William C.....	19865	Riker, George A.....	20609
Heitmuller, Alfred.....	20812	Romeyn, Henry.....	20535
Higgins, C. W.....	19872	Schmid, Louis, & Sons.....	20126, 20141
Hinman, H. E.....	20596	Schmid, Louis, & Sons.....	20342
Hornaday, William T. 19879, 19894, 20049,		Schneck, J.....	20650
	20244, 20715	Sellner, J. J.....	20223
Hill, Robert T.....	20779	Shutt, G. W.....	19816
Hoxie, R. L.....	20707	Smith, W. R.....	20213
Jackson, W. W.....	20089	Steinmetz, Carl.....	19870
Johnson, W. F.....	20398	Stoutenburgh, Walter S.....	20736
Kuehling, Miss Lizzie.....	20813	Taylor, George L.....	19876
Lindberg, J. J. E.....	20143	Terrell, L. D.....	20694
Mace, Joseph.....	20344	Thorne, Clinton.....	20202
Machenheimer, G. L.. 20103, 20130, 20135,		Uber, C. Edgar.....	20635
	20200, 20243	Wales, Orlando G.....	20474
Maugault, G. E.....	20059	Walker, James W.....	20128
Melville, John.....	19871	Weeden, W. C.....	20444
Merriam, C. Hart.....	19864	Wells, L. B.....	19877
Miller, Alexander McVeigh.....	20613	Winchester, Repeating Arms Co.	20805
Moore, George H. H.....	20140	Wood, Nelson R.....	20399, 20445
Moxley, L.....	20168	Yaste, W. J.....	20053
Nowell, Frederick D.....	20597		



INDEX.

	Page.
Abbott, W. H, sends stone implements	70
Abrohhos Islands, visited by the steamer <i>Albatross</i>	178
Acapulco visited by the steamer <i>Albatross</i>	178
Accessions during the year, extent of	21
geographical index to list of	791
review of the more important	66
index by Museum departments to list of	805
to Museum since 1881, number of	20
to the collections	20
to the Museum during year ending June 30, 1888, list of	735
<i>Aceridiidæ</i> sent to Lawrence Bruner for study	51, 168
<i>Acrotus willoughbii</i>	73
Adair, Oliver B, sends Chinese coins	74
Adams, John, pamphlet signed by	115
Adams, John Quincy, quoted	13
Adams, W. H., sends stone implements	69
Adler, Cyrus, appointed assistant curator of oriental antiquities	27, 29, 93
report of	93
Administration, papers on, published during the year	48
sectional library	42
Administrative staff	28
work	53
work, review of the	40
Adzes used by the Indians of the Northwest coast	279
Æsthetic characters of the Indians of Northwest coast	242
Africa, accessions from	66
information furnished to correspondents in	58
African porcupine mounted	61
Agassiz, Professor Alexander, correspondence with	163
<i>Agelaius phæniceus</i>	148
Agricultural College, Ames, Iowa	180
Agriculture, Department of, collections of insects received from the	168
Aiken, C. E., birds purchased from	146
sends birds	68
<i>Aimophila sonorana</i>	146
Ainos, fire-making implements used by the	550
Aino Strike-a-light	583
Alabama, information furnished to correspondents in	58
stone implements from	67
university of	180
Alaska, accessions from	67
Commercial Company	77
reference to courtesies shown by the	46
Albany museum, Cape Colony, sends South African shells	66, 162

	Page.
<i>Albatross</i> , Alaskan cruise of the	178
collections made by the	80
cruise of the, between Chesapeake Bay and Wood's Holl	177
to the North Pacific Ocean	178
dredging accomplished by the	174, 178
fishes collected by U. S. F. C. steamer	34
investigation in regard to mollusks collected by the steamer	163
preservation of fishes collected by the steamer	156
results of cruise of the	173
work upon mollusks collected by U. S. F. C. steamer	35
Albuquerque meteorite, specimen of the	195
Alcoholic mammals	141
Aldrich, T. H., sends fossils	67
marine shells	162
Aleutian Islanders, method of fire-making by the	568, 576
Alexandria, cake-cutter from	90
Alfaro, Anastasio, presents type of <i>Porzana alfari</i>	146
Algae, exhibition of	190
Alignments	626
Allen, Dr. T. F., identifies <i>characeæ</i>	52, 193
Allen, J. A., notice of paper by	707
Allen, J. I. and T. C., send ethnological objects	71
Allen, Lieut. H. T., presents quiver, bow, and arrows	69, 78
Alma College, Alma, Mich	180
Amateur Botanical Club of Washington, meetings of the	51
America, accessions from	66
American aboriginal pottery, additions to the collection of	31
catalogue entries in department of	23
honorary curator of	27
number of specimens in the collection of	22
report on the section of	105
review of work in the department of	31
Historical Association, allusion to the	16
Institute of Mining Engineers, collection of	21
transfer of collection of	8
Oriental Society	93
Ornithologist's Union	33
Amherst College, exchange of meteorites with	195
<i>Ammodramus brunnescens</i>	146
<i>princeps</i>	146
<i>Ammoperdix bonhami</i>	147
<i>Amphispiza quinquestriata</i>	146
Ancient Indian matting, paper on	673
sepulture, methods of, among the Indians of the northwest coast	351
Anderson River, fire-making outfit from	561
Andrus, Rev. A. N., sends Assyrian seal for copy	94
Angeles, Bay of, collection from	127
<i>Anhinga anhinga</i>	148
Animal products, acting curator of	27
catalogue entries in section of	23
collection, extent of	22
Anoatok, fire-making apparatus of the Eskimo of	576
<i>Antedon phalangium</i>	174
Anthropological lectures delivered in Museum, list of	88
Antidotes for snake bite, experiments with	154

	Pago.
Antlers of North American deer	141
Antwerp, ethnological objects from	90
Annual Report of the Museum, reference to the	18
Appomattox Court-House, oak tree riddled with bullets, from	30, 116
Apache fire tools	542
Indians, photographs of	89
Yumas, fire implements used by the	542
Arabia, arrowheads from	126
<i>Arachnida</i> received from Dr. Marx	169
<i>Aramides</i> sp.	146
Archæological objects, negatives of	65
prints made	65
Archæology, papers on, published during the year	48
sectional library of department of	42
Arctic plants collected by Dr. Bessels	191
<i>Arctiideæ</i> , arrangement of the	170
<i>Ardea virescens frazari</i>	146
Arechavaleta, José, sends fishes from South America	156
studies on fishes sent by	34
Argentine Republic, information furnished correspondents in	58
Arizona, collections from	68
information furnished to correspondents in	58
Arkansas, bowie-knife from	90
collections from	68
information furnished to correspondents in	58
iron meteorite, cast of	63
Armor weaving, details of	269
worn by the Indians of the northwest coast	268
Armory building used for storage of Museum collections	11
Army Medical Museum, allusion to the	7
Arapahoe Indians, war shield of	89
Arrow or spear heads, or knives	637
Arrows used by the Indians of the northwest coast	286
Arts and industries, assistant secretary, curator of	27
catalogue entries in department of	23
number of specimens in department of	22
review of work in department of	29
<i>Arvicola quasiater</i> , from the valley of Mexico	140
Asia, accessions from	74
Minor, shells from	74
Assignment of space	24
Assinaboines, ethnological objects used by the	89
Assistant secretary, sectional library of the	42
Assyrian and Babylonian antiquities, formation of collection of	27
seals, casts of	63
lent to the Museum	93
<i>Atalapha</i>	140
Atwater, W. O., honorary curator of foods	27
notice of papers by	707
<i>Augusta</i> , steam-steering engine of steamer	110
Australasia, collections from	75
Australian museum, exchange with	46
sends geological collections in exchange	75
plants received from Baron Ferd. V. Müller	191
tribes, fire implements used by	570

	Page.
Austria, information furnished correspondents in	58
Avery, Dr. Wm. C., presents birds, birds' eggs and nests	146, 151
Awls, bone, used by Nungit Indians	263
Babcock, E. C., sends a white goat skin	71, 140
Babylon, ethnological objects from	91
Babylonian seals, casts of	63
lent to the Museum	93
Badges of civic societies	115
Bahia visited by the steamer <i>Albatross</i>	173
Bailey, Prof. L. H., jr., examines specimens of the genus <i>Carex</i>	52
redetermines plants of the genus <i>Carex</i>	193
Baird, Prof. Spencer F	80, 93
allusion to death of	3
at Wood's Holl	179
bequest to library by	41
bust painted	63
cited	8
notice of report of	707
Baird, Mrs., collection of postage-stamps received from	116
Baker, Frank, member of lecture committee	50
Baker University, Baldwin, Kans.	180
Baldwin, A. H.	175, 180
Ball, E. M., notice of paper by	707
Ballymenoch, collection from vicinity of	129
Baltimore and Ohio Railroad Company, models deposited by the	109
Baltimore and Ohio Telegraph Company	55
Baltimore, ethnological implements from	90
Banner-stones	649
Bark used as food by Indians	277
Barnes, Prof. Charles R., identifies mosses from the Yellowstone Park	52, 192
Barnum, M. K., sends birds	72
Barreswill, allusion to	118
Barse, J. F., presents cut beryls	195
Bartholdi's statue of Roman soldier repaired	63
Bartlett, Edward, birds exchanged with	146
coleoptera received from	167
contributes reptiles	153
varied collections	75
notice of paper by	707
sends birds' eggs and nests, and reptiles	66
Baskets made by the Indians of the northwest coast	313
Basket-work of the North American Aborigines, reference to paper on	30
Bastow, R. W., sends shells from Mexico	67
Batchelor, Ward, pottery received from	31
sends stone idols from Mexico	67
Bates, H. W., insects determined by	167
Batons, ceremonial, used by the Indians of the Northwest coast	271
Batrachian skeletons cleaned and mounted	64
Baxter, R. L., presents opHITE marble	201
Beach, H, sends stone implements	73
Beachler, Charles S., contributes reptiles	153
sends reptiles and fossils	69
Beacom, Lieut. J. H., contributes specimens	78

	Page.
Beacom, Lieut. J. H., sends skin of <i>Salvelinus namaycush</i>	157
Bean, Barton A., aid, department of fishes	28
Bean, Dr. T. H., acknowledgment of services of	80
collects birds, crustaceans, and fishes at Somers Point, New Jersey	71
crustacea	174
contributes reptiles	153
honorary curator of department of fishes	28, 34, 155
investigates the fishes of Great Egg Harbor	34
Southern mackerel fishery	34
makes collections in Great Egg Harbor	80
notice of papers by	707, 708
visits the mackerel grounds between Cape Hatteras and Cape Cod	179
Beath, James W., sends cut stones	72
Bear hunting by the Indians of the northwest coast	301
Beckham, C. W., death of	27, 33
notice of papers by	708
presents birds	73, 146
bird skins	70
Beck, Senator J. B., introduces a bill for the establishment of a zoological park	218
Beecher, C. E., correspondence with	163
presents minerals	196
Bella-Bella, fire-making implements from	534
Bell, Howard, sends stone implements	72
Bell, James, contributes reptiles	153
Bement, C. S., presents minerals	196
Bendire, Capt. Charles E., acknowledgment of services of	78
honorary curator of birds' eggs	28, 33, 151
fossil plants collected by	189
identification of fossil plants collected by	52
plants collected in Oregon by	37
notice of papers by	708
on extinction of Pallas's cormorant	33
Benedict, James E., paper by	47
Benners, G. B., sends birds	73
Bennett, L. J., sends fossil crustacea	71
Benson, Lieut. H. C., birds' eggs contributed by	33, 151
contributes reptiles	153
skins and eggs of birds and reptiles	78
presents birds	146
sends collections from Arizona	68
Benét, General S. V., transmits historical objects to the Museum	77
Bergen museum, birds exchanged with	146
Bering Island, information furnished correspondents in	58
whale skull and skeleton from	140
Berlin, allusion to museums in	6
fishery exhibition, reference to collections obtained at	21
museums, reference to	133
Berries as food of Indians	276
Bessels, Dr. Emil, arctic plants collected by	191
sends plants from Spitzbergen	75
Bethnal Green Museum, allusion to	6

	Page.
Beyer, Dr. H. G	29, 113
acknowledgment of services of	79
notice of report of	708
recalled by the Navy Department	27
Bible, coins mentioned in the	115
Bibliography of papers on prehistoric anthropology	599
the U. S. National Museum during the fiscal year ending June 30, 1888	703
traditions among Indians	381
Biddle, Dr. Clement, drawing of <i>Pilocarpus pennatifolius</i> lent for study to	52
Bien, allusion to	118
Bierstadt, allusion to	118
Bigelow, Robert P., work-room granted to	53
Billings, Dr. J. S., assistance rendered by	78
member of lecture committee	50
Binding of volumes for Museum library	44
Biographical papers published during the year	48
Biological Society, annual meeting of the	51
Biology, paper on, published during the year	48
Bird collection, enumeration of	150
exhibit for the Cincinnati Exposition	145
Bird Rocks and Funk Island in 1887, cruise to	493
Birds, additions to the collection of	33
catalogue entries in department of	23
curator of	28
distribution of	45
Birds' eggs, accession to collection of	151
additions to the collection of	33
catalogue entries in section of	23
Charles E. Bendire, honorary curator of	28
collected for food by Indians	278
condition of the collection	152
distribution of	45
number of specimens in the collection of	22
papers on, published during the year	48
report on section of	151
review of work in section of	33
Bird-shaped objects	650
skeletons cleaned and mounted	64
skulls cleaned and mounted	64
Birds, labels printed for department of	59
living, deposited in the Museum	222
obtained by purchase	222
presented	221
mounted during the year	62
number of specimens in the department of	22
papers on, in Proceedings, vol. 9	47
published during the year	48
permits granted to shoot	51
rearrangement of exhibition series of	149
report on department of	145
review of work in the department of	32
sectional library of department of	43
study series of	149
used as food by Indians	278

	Page.
Bird-traps used by the Indians of the northwest coast.....	294
Bison group in Museum	141
Blackford, Hon. E. G., presents living buffaloes.....	40, 215, 216
sends fishes	157
Blake Expedition, work on the gastropods of the.....	162
investigations in regard to mollusks collected by the steamer.....	35, 163
Blakiston, T. W., paper by	47
Board of Regents pertaining to the organization of the Smithsonian Institution, resolution of.....	3
Boas, Dr. Franz, on the social organization of the Kwakintl.....	244
sends ethnological objects	66
Boehmer, George H., paper by	47
Bolles, Lieut. T. Dix.....	87
assigned to active duty	79
assistance rendered by	51
completes arrangement of Eksimo collections.....	30
objects contributed by	79
presents swords, carvings, etc., from Japan	74
sends fossils	70
Bollman, Charles H., myriapods from	167
notice of paper by	708
paper by	47
Bolton, Prof. H. Carrington, lecture by.....	50
Bombycid lepidoptera, arrangement of the	35, 165
Bombyliidæ, completion of work on the	169
Bone combs used by the Tlingit Indians.....	260
implements.....	665
Bonnett, Hon. Peter, assistance rendered by.....	77
bidarkas obtained through courtesy of	68
Books, amount expended for.....	56
withdrawn from library, number of.....	41
Botanical section of the Biological Society of Washington, meetings of the ..	51
Botany, exhibition space assigned to collection of.....	25
Boulogne-sur-mer, strike-a-light from.....	579
Bourke, John G., necklace collected by.....	78
Bowen, Amasa, pigmy sperm-whale received from.....	77
Bower, Dr. A. G., seals lent by	93
Bowers, Dr. Stephen, correspondence with	163
Bowers, T. B., sends stone implements	72
Bowman, D. A., presents minerals	196
Bows and arrows, arrangement of collection of.....	87
method of installation of	87
Boyle, C. B	187
Bozeman, plants collected near	191
Bracelets worn by the Indians of the northwest coast.....	262
Brackett, Fred., agent of the Minneapolis Exposition	83
Brazil, National Museum of, exchange of meteorites with	195
Brewster, William, notice of paper by	708
sends birds.....	68, 146
Mexican birds.....	67
Bridgman, A., jr., presents a swan's skin	69
British America, accessions from.....	66
Columbia, accessions from.....	66
ethnological research in	232

	Page.
British Museum, allusion to	6
exchange of meteorites with	195
Bronze age	629
Brown, A. E.	140
co-operation of	181
Brown, George E., presents a gray fox	216
Brown, Herbert, contributes birds' eggs	68, 151
Brown, S. C., registrar	44, 66, 217
Brown, S. G., presents reptiles	154
Brown, W. G., geological collections made by	80
nickel silicates transmitted by	196
Brunner, T. K., presents minerals	196
Brunner, Lawrence, insects collected by	166
studies the <i>Aceridiæ</i>	51
Brussels, allusion to museums in	6
<i>Bubo virginianus subarcticus</i> , eggs of	151
<i>Bucorvus caffer</i>	147
Buda-Pesth, allusions to museums in	6
Buffaloes, mounted group of	60
presented by Hon. E. G. Blackford	40
purchased	215
Buildings and labor, force employed on	53
work accomplished in department of	53
Building stones, completion of hand-book of the collection of	38
preparation of duplicate sets of	39
Bulletin 32 of the National Museum	48
33 of the National Museum	48
34 of the National Museum	48
of the National Museum, reference to the	18
Burchard, allusion to	118
Burchell's zebra, skull of	140
Bureau of Ethnology, collections received from the	105
curator detailed from the	27
Engraving and Printing, collection of proofs from	77
of bonds and notes, pre- sented by	30
India proofs, received from	115
installation of collection from	24
information	55
Burgess, Prof. Edward S., papers read by	51
Burmah, ethnological objects from	91
Burnett, William, deposits General Lafayette's flint-lock pistols	30, 116
Barnham, Parry, Williams & Co., acknowledgment of courtesies extended by	111
Burns, Frank	159
geological collections made by	80
Burns, W. C., contributes reptiles	154
Burns, W. R., sends stone implements and other objects	70
Burt, Grinnell, presents minerals	196
Bush, Miss C. E.	180
Bush, Miss K. J.	177, 180
<i>Buteo latissimus</i> , eggs of	151
Butler, Amos W., notice of papers by	708
presents birds	146
Butler and Henson, minerals purchased from	196
Butler, F. H., sends minerals from England	74

	Page.
Cabin Creek meteorite	46
<i>Cacatua moluccensis</i>	146
Cairo, ethnological collection from	91
<i>Calamariæ</i>	190
California, collections from	68
information furnished to correspondents in	58
spermophile from	61
State Mining Bureau, minerals exchanged with	196
sends minerals	68
vulture, near extinction of the	32
<i>Callipepla squamata</i> , eggs of	151
Call, R. E., sends collection from Missouri	70
sends fishes	70, 157
reptiles	153
shells and parasites received from	162
Cambrian fossils in exhibition series	184
Cambridge, England, bones of dodo received from	36
University Museum, specimens from the	181
Camden and Amboy Railroad, block, rail, and joint from the	109
Canada, accessions from	67
information furnished correspondents in	58
Canoe-making by Indians of the northwest coast	297
Canoes used by the Indians of the northwest coast	294, 295, 296
Canopus inscriptions, molds of	64
Canterbury Museum, exchange with	46
Cape Vancouver, fire-hearth from	565
Capron collection, arrangement of the	25
bill for purchase of the	19
re-arrangement of the	66
Caranchua Indians, fire-tools used by the	545
Carboniferous fossils in exhibition series	184
<i>Carex</i> , examinations of specimens of, by Prof. L. H. Bailey, jr.	52
Carnivora, preparation of dry skins of	62
Carolina parakeet, near extinction of	32
Carpenter, Capt. W. L., contributes reptiles	153
sends collections from Arizona	68
large zoological collections	78
Carpenter, Dr. P. Herbert, contributes crinoids	174
<i>Carpodacus cassini</i> , eggs of	151
Carus and Englemann's Bibliotheca	142
Carvings by the Indians of the northwest coast	324
Case for buffalo group	60
Cases, amount expended for	56
furnished by contractors during the year, list of	56
repainting of	113
Catalogue entries	23
of batrachians and reptiles of Central America and Mexico	48
batrachians and reptiles of North America	48
Chinese porcelains in the Hippiusley collection	442
Corean mortuary pottery in the National Museum	592
minerals and synonyms	48
Catlin collection of Indian paintings	21
gallery, number of paintings in the	22
Catawba Indians, pottery from the	105

	Page.
Cenozoic fossils, additions to the collection of.....	35
honorary curator of	28
extent of the collection of.....	22
sectional library in department of.....	43
Census of the collections	21
Central America, accessions from	67
collections received from.....	11
idols and images from.....	134
mammals from.....	140
prehistoric collections from.....	134
American birds, review of.....	32
station of U. S. Fish Commission, specimens received from the.....	80
Ceramic art in China, history of the.....	387
Ceramics, assignment of space for.....	25
Ceremonial blankets worn by the Indians of the northwest coast.....	263, 272
leggings worn by the Indians of the northwest coast.....	273
paraphernalia worn by the Indians of the northwest coast.....	268
shirts worn by the Indians of the northwest coast.....	273
Chalitmute, fire-making outfit from.....	565
Chamberlain, C. W., birds exchanged with.....	146
Chang-yao porcelain.....	404
<i>Characeæ</i> identified by Dr. T. F. Allen	52
Chellian epoch.....	608
Chemical laboratory in the Museum, reference to the.....	18
products, extent of collection of.....	22
Chemistry, papers on, published during the year	48
Ch'ênghua period, manufacture of porcelain during the.....	414
Chêngtê period, manufacture of porcelain during the.....	415
Cherokee Indians, pottery from the.....	105
fire-making implements used by the.....	547
wooden pipe used by the	90
Cherrie, George K.....	60
Cheyenne, ethnological objects from.....	89
Chiaching period, manufacture of porcelain during the	416
Chichou-yao porcelain	406
Chickering, Prof. J. W., paper read by	51
Chief clerk, Smithsonian Institution, sectional library of	42
Chiefs among Indians of the northwest coast	250
Chieftaincy among the Indians of the northwest coast.....	372
Chien-yao porcelain.....	406
Children, Indian ceremonies among.....	369
Chili, drugs from.....	114
ethnological objects from.....	74, 90
Chilkat chief, dress of.....	264
China, collections from.....	74
drugs from	114
ethnological objects from	91
information furnished correspondents in.....	58
Chin dynasty, manufacture of porcelain during the	389
Chinese and European methods of manufacturing porcelain compared.....	434
porcelain into Europe, introduction of.....	427
porcelains, Hippisley collection of	387
in the Hippisley collection, catalogue of.....	442
strike-a-light.....	582
Ching-tê-chên, porcelain factories at.....	418

	Page.
Chinook Indians, fire-making apparatus of the.....	536
Chippewa Indians, ethnological objects from	90
Chiriqui, antiquities from.....	135
pottery from	105
Chiroptera, preparation of dry skins of.....	62
Chisels, gouges, and adzes	646
used by the Indians of the northwest coast.....	282
Chittagong tribes, fire-making by the.....	569
Chorography of southern Alaska and northern British Columbia.....	231
Christian burial practiced by the Indians of the northwest coast.....	356
Christiania, allusion to museums in.....	6, 133
Chukchis, fire-making apparatus of the.....	562
Chun-yao porcelain	404
Church & Co., Joseph, sends fishes and mollusks.....	72
Cicindelidæ, arrangement of the	168
Cincinnati Exposition, additional labor in preparing exhibits for the.....	53
exhibit of birds prepared for the.....	32
exhibit of mammals at the.....	219
preparation of exhibits for.....	28, 54
preparation of mineral exhibit for	38
reference to exhibit prepared for the.....	19
shipment of exhibits to.....	44
specimens packed for the	64
Circular 36, abstract of replies to.....	692
object of.....	48, 125
statement of persons sending specimens in response to.....	687
concerning paleolithic implements, questions contained in.....	630
issued by the Smithsonian Institution concerning American aboriginal stone relics	680
Circulars of the Museum, reference to the.....	18
Clark, A. Howard, editor of Proceedings and Bulletin	48
in charge of collection of historical and personal relics.....	27, 29, 115
notice of papers by.....	708, 709
Clark, John N., sends birds' eggs and nests	69
Clark, J. W., sends fossil bones	74
Clarke, F. W	41
acknowledgment of services of.....	80
honorary curator of minerals	28, 38, 195
lecture by	50
notice of papers by.....	709
Classification of scientific departments	27
Cleveland, Hon. Grover, presents a living eagle.....	76
Club-heads	655
Clubs used by the Indians of the northwest coast	282
Cluny Museum in Paris, allusion to.....	6
Coale, H. K., birds exchanged with.....	146
notice of papers by.....	709
sends bird-skins from India	74
bird-skins from South America	74
Coast Indians of Southern Alaska and Northern British Columbia.....	225
Cockerell, Theodore D. A., contributes reptiles	153
forwards collections from Colorado.....	68
Cœur d'Alene Indians, ethnological objects from	89
Coffin, E. F., wood alcohol products collected by.....	209
Coins and medals, additions to collection of.....	30

	Page.
Coins and medals, collection of	115
extent of collection of	22
labels printed for collection of	59
Colburn, Dr. G. F. I., sends historical objects	72
Cole, Alan, allusion to	4
Cole, Dennis, preparator	178
Cole, Sir Henry, allusion to	4
Coleoptera, arrangement of the	35, 165
placed on exhibition	25
systematic arrangement of the	169
Collections, condition of the	20
increase of the	8, 10
installation of	24
made by expedition to Funk Island	82
temporary storage of	10
Collins, Capt. J. W., acknowledgment of services of	80
commands the <i>Grampus</i> on expedition to Funk Island	81
honorary curator of naval architecture	27
notice of papers by	709, 710
Colorado, collections from	68
information furnished to correspondents in	58
miner's candlestick from	89
Colorist, work accomplished by the	65
<i>Columba fasciata</i> , eggs of	151
Comanche Indians, strike-a-light used by the	580
Combs used by Tlingit Indians	259
Commander Islands	33
Commemorative columns constructed by the Indians of the northwest coast ..	327
Commissioner of Fish and Fisheries (U. S.), assistance rendered by the	81
Common mole mounted	61
mouse mounted	61
Comparative anatomy, acting curator of	28
catalogue entries in department of	23
cataloguing and preservation of specimens in department of	36
number of specimens in the department of	22
report of the department of	181
review of work in department of	36
Condition of the collections	20
Congo River, ethnological collection from	91
Conklin, W. A., contributes specimens	146, 153
co-operation of	181
Connecticut, collections from	68
information furnished to correspondents in	58
knuckles, ball and chain from	90
Consanguineal organization of Indians	246
Cooking utensils	656
Cooper, D. J. G., correspondence with	163
Cooper, William, presents minerals	196
Co-operation of Departments and Bureaus of the Government	76
Cope, E. D., bulletin 32 of the National Museum by	48
34 of the National Museum by	48
continues studies upon the batrachia	34, 51, 154
notice of papers by	710
paper by	47

	Page.
Cope, E. D., reptiles sent to.....	154
Copenhagen, allusion to museums in.....	6
prehistoric museum at.....	132
Copper implements and ornaments.....	665
plates owned by the Indians of the northwest coast.....	335
Coquillett, D. W., diptera received from.....	167, 169
sends insects.....	68, 163
Corea, collections from.....	74
drugs from.....	114
ethnological objects from.....	91
Corean drugs, purchase of collection of.....	29
medicines, a collection of.....	113
Correspondence and reports.....	57
increase of.....	59
Correspondents, information furnished to.....	58
Cory, C. B., birds exchanged with.....	146
contributes reptiles.....	73, 154
notice of papers by.....	710
presents birds.....	146
Costa Rica, collections from.....	67, 135
fire tools from.....	545
National Museum presents birds.....	146
Government sends the director of its National Museum to Wash- ington.....	11
photographs and arrows from.....	90
<i>Cotinga amabilis</i>	146
Cones, Elliott, notice of paper by.....	710
Cox, W. V., chief clerk.....	53
report of, upon participation of Smithsonian Institution in Minne- apolis Exposition.....	82
representative of Smithsonian Institution at Minneapolis Indus- trial Exposition.....	28
Coyotes, group of, mounted.....	60, 141
Cradles of the American aborigines, reference to paper on.....	30, 88
Indians of the northwest coast.....	319
Craigavard, excavation of cave at.....	130
Crawford, Marion, sends stone implements.....	70
Crawford, Prof. A., courtesy of.....	94
Crawford's statue of Washington.....	63
Creek Indians, fire-making apparatus used by the.....	548
Creel, H. M., sends ethnological objects.....	69
Creepers, Mexican and Central American, review of.....	150
Crosby, W. O., sends minerals.....	69, 72, 200
Cross, Whitman, geological collection made by.....	80
Crow Indians, ethnological objects used by the.....	89
Crustacea, Prof. S. I. Smith studies.....	52
Cuba, parrot from.....	73
Cumberland Gulf, fire-making implements from the.....	558
Cuming's Philippine land-shells.....	160
Cunningham, C. W., geological collections made by.....	80
presents minerals.....	196
Cup-stones.....	661
Curator of American aboriginal pottery, report of.....	105
birds, report of.....	145
birds' eggs, report of.....	151

	Page.
Curator of comparative anatomy, report of.....	181
ethnology, report of.....	87
fishes, report of.....	155
fossil plants, report of.....	189
graphic arts, report of.....	117
historical relics, coins, medals, etc., report of.....	115
insects, report of.....	165
lithology and physical geology, report of	199
living animals, report of.....	213
mammals, report of	139
marine invertebrates, report of.....	173
materia medica, report of	113
mesozoic fossils, report of	187
metallurgy and economic geology, report of	209
minerals, report of	195
mollusks (including tertiary fossils), report of.....	159
oriental antiquities, report of.....	93
paleozoic fossils, report of	183
prehistoric anthropology, report of	123
recent plants, report of.....	191
reptiles and batrachians, report of.....	153
transportation and engineering, report of.....	107
Curators' reports	85
Currency used among the Indians of the northwest coast.....	334
Current administrative work	53
Curtis, J. S. metallurgical specimens collected by	39, 210
Cushing Academy, Ashburnham, Mass.	180
Cutting and Bradford, allusion to.....	118
Cutting tools.....	656
Cyanotypes made	65
Dagger-guards used by Tlingit Indians	286
Daggers used by the Indians of the northwest coast	283
Dakota, collecting-trip to	81
ethnological objects from	69
information furnished to correspondents in.....	58
Dallas, allusion to.....	118
Dall, W. H., acknowledgment of services of.....	80
geological collections made by	80
honorary curator of mollusks (including tertiary fossils).....	28, 35, 159
member of lecture committee.....	50
notice of papers by	710, 711
papers by	47
selects shells from collection at museum of Wesleyan University..	69
Danish America, kyaks from	67
Daubrée, M. A., exchange with.....	46
Davanue, allusion to	118
Davenport Academy of Natural Sciences, sends stone implements	68
Davis, Howard B., sends stone implements	72
Dawkins, Prof. W. B., on fire-making by percussion.....	572
Dawson, Dr. George M., correspondence with.....	163
Dawson on intertribal relation of totems.....	248
on totems of Haida Indians	249
Day, Dr. David T., lecture by.....	50
Decoration of porcelain.....	439
Deer hunting by the Indians of the northwest coast	300

	Page.
Deer skins collected in Honduras.....	32
Delaware and Hudson Canal Company, gifts from the	108
Indians, fire-making as practiced by the	547
information furnished to correspondents in	58
<i>Dendroica kirtlandi</i>	147
<i>vigorsii</i> , nests and eggs of.....	151
Denmark, information furnished correspondents in.....	58
Denton, S. W., birds purchased from.....	146
Denver, collection of minerals from.....	38
Department index to list of accessions	805
of living animals, organization of the.....	81
living animals, reference to formation of.....	20
Science and Art in England, allusion to.....	7
Departments in Museum unprovided with space.....	10
<i>Dendrocincla</i> , monograph of the genius.....	32, 150
Devonian fossils in exhibition series	184
marbles received.....	39
Dewey, F. P., curator of metallurgy and economic geology.....	28, 39, 209
notice of papers by	711
Diagram showing measurements of femora of the Great Auk.....	522
humeri of the Great Auk	521
skulls of the Great Auk	517
tibiæ of the Great Auk.....	522
Diamantina, bird skins from	74
Dicotyledons.....	190
<i>Didus ineptus</i>	181
Diller, J. S., collects fulgurites.....	201
studies collections of rocks	52
Dip-nets used by the Indians of the northwest coast	294
<i>Dipodomys deserti</i> , skin of.....	139
Dippers, Mexican and Central American, review of.....	150
Discoidal stones	654
Discovery of prehistoric man, the	598
Dishes used by the Indians of the northwest coast	316
<i>Distoma macrostoma</i> , description of.....	162
Distribution of duplicates.....	44
marine invertebrates	180
specimens since 1854.....	45
District of Columbia, accessions from the.....	69
ethnological objects from the	90
information furnished to correspondents in	58
prehistoric implements from the	126
study of the flora of the.....	38
Dixon Entrance, Indians of.....	236
Dixon on ornaments of Tlingit and Haida Indians	262
daggers of Haida and Tlingit Indians.....	283
Djati Pengilon meteorite, piece of the.....	195
Dodge, W. H., sends a ceremonial weapon	69
Dodo, bones of the.....	36, 181
Doering, George E., paper by	47
Dole, C. A., presents a gray wolf	216
Dolmens.....	623
Dolphins, type specimens of.....	142
Donaldson, Hon. Thomas, reference to paper by.....	47
notice of paper by	711

	Page.
Dorsey, Dr. J. Owen	549
Dos Novillos, antiquities from	134
Douglas, A. B., moose-skins obtained from	140
Douglas, Sir James, quoted	241
Drag-nets used by the Indians of the Northwest coast	293
Drake, Dr. J. M., sends stone implements	73
<i>Drepanornis albertisi</i>	147
Dresser, H. E., birds purchased from	147
Drew, S. H., exchange with	46
fossil shells in exchange from	75
Drums used by the Indians of the northwest coast	331
Dry skins of mammals, preparation of	62
Dublin museums, reference to	133
Dueling among the Indians of the northwest coast	342
Dugès, Prof. A., forwards specimens for determination	67
presents meadow mouse	140
Mexican birds	147
Duly, A. A., geological material received from	200
presents a collection of rocks	71
Duplicates, distribution of	44
Dutcher, William, notice of paper by	711
Dutch Guiana, information furnished correspondents in	58
Dwellings of the Indians of the northwest coast	303
Dwyer, P. O., presents minerals	196
Dyche, D. T. D., sends stone implements	72
Dynamical and physiographical geology	203
Dynamic geology, exhibition series	39
Eagle Pass, jaguar received from	40
Earll, R. E., acting curator of animal products	27
fisheries	27
notice of papers by	711
assists in the preparation of exhibits for Cincinnati Exposition	54
Early history of the Museum	4
Ear ornaments worn by the Indians of the northwest coast	261
Easter Island, ethnological collections from	30, 75, 92
Eastman, J. R., member of lecture committee	50
Echfeldt, Dr. John W., identifies lichens	52, 193
sends mosses and lichens	74
Edentates, preparation of dry skins of	62
Edinburgh museums, reference to	133
Editor of the American Lithographer and Printer, letter from J. W. Osborne	
to	120
of Proceedings and Bulletin	48
Smithsonian Institution, sectional library of	443
Edwards, Charles L., papers by	47
Edwards, Vinal N., collections made by	80, 174, 180
sends birds	147
Egg of Sargou I, mold from cast of	94
Egg-shell porcelain	411
Egleston, Dr. Thomas, bulletin 33 of the National Museum by	48
Egleston, Nathaniel H., lecture by	50
Egloffstein, allusion to	118
Egypt, accessions from	66
ethnological collection from	91
information furnished correspondents in	58

	Page.
Eigenmann, Carl H., notice of papers by	712
paper by	47
Eidlitz, allusion to	118
Electric service, contract for	55
Elephas in equus beds	127
Elliott, D. G., notice of paper by	712
Ellis, Charles R., contributes reptiles	153
Ellis, J. Frank, assistance rendered by	40, 213
El-Paso, black bears received from	40
Emmons, C. P., sends stone implements	72
Emmons, Dr. E., collection of	160
Emmons, S. F., collects ores and rocks	68, 201, 210
geological collections made by	80
report on geology of Leadville by	39
Emotional characteristics of the Indians of northwest coast	238
Engineer Corps of the Army, collections made by the	18
England, annual expenditures upon museums in	9
collections from	74
ethnological material from	90
information furnished correspondents in	58
prehistoric implements from	126
English, J. D., presents minerals	196
English tinder-flints	577
Entomological investigations prosecuted	36
Entomology, papers on, published during the year	49
Eolithic age, the	604
Ermine, the capture of, by the Indians of the northwest coast	302
Eskimo collection, arrangements of the	87
classification of the	51
completion of arrangement of	30
dog mounted	61
family, models of an	88
fire-making apparatus	555
four-part fire-making apparatus	555
Establishment of the Smithsonian Institution	17
Ethnical relations of Indian tribes	382
Ethnological collection, arrangements of	87
installation of	24
material, accessions of	89
museum in Paris, allusion to	6
prints made	65
research in British Columbia	232
specimens, distribution of	45
specimens, negatives of	65
Ethnology, additions to department of	30
catalogue entries in department of	23, 30
curator of	27
labels printed for department of	59
number of specimens in department of	22
papers published on	49
report on the department of	87
review of work in department of	30
sectional library of department of	43
Etowah Mound, excavation of	134
Elting, Mr., historical pamphlets deposited by	115

	Page.
Eulachon fishing by the Indians of the northwest coast	299
Eureka, silver-lead district of	39
Europe, accessions from	74
Chinese porcelain introduced into	427
Evans, George W., museum appropriations disbursed by	79
Everette, Mrs. J. H., pearls received from	162
Evermann, Barton W., papers published by	47
Examination and report, material sent for	59
"Excavations in Assyria and Babylonia"	95
Exchanges	44
Exhibition halls, re-arrangement of the	19
series, development of	5
Exhibits forwarded by the Smithsonian Institution to the Minneapolis Exposition	83
Expedition for obtaining living animals	20, 213
Explorations in the results of which the museum has participated	81
Faris, Lafayette, sends stone implements	72
Faucher, G. L., sends arrow heads	68
Fayette County meteorite, fragment of the	195
Ferguson, Maj. T. B	179
Ferarri-Perez, Fernando, papers published by	47
Fewkes, Prof. J. Walter, reports upon the Medusæ	52, 177
"Fifty Years of Public Work"	4
Figures of prehistoric objects from Ireland	131
Finances of the Museum	56
Finger-rings worn by the Indians of the northwest coast	262
Fire-making apparatus in the U. S. National Museum	531
by percussion	571
plowing	570
reciprocating motion	533
sawing	569
specimens in National Museum, list of	586, 587
Fish-baskets used by the Indians of the northwest coast	292
Fish Commission (U. S.), assistance rendered by the	213
birds transmitted by	148
contributes reptiles	153
contributions of the, to the department of marine invertebrates	174
co-operation of the	79
courtesy of the	20
curators of the Museum detailed from the	26
expedition to Funk Island by the	81
explorations of the	177
photographic work for the	65
presents a rainbow trout	73
Professor Baird alluded to as founder of the	3
renders assistance in obtaining living animals	40
sends fishes	157
Fisher, Dr. A. K., contributes birds' nests and eggs	33, 69, 151
notice of paper by	712
Fisheries, acting curator of	27
and fishing grounds, papers on, published during the year	49
catalogue entries in section of	23
collection, extent of	92

	Page.
Fisheries Exhibition in London, methods of arrangement of United States exhibit at the.....	11
Fishery industries, papers on, published during the year.....	49
Fishes, accessions by localities.....	156
additions to the collection of.....	34
catalogue entries in department of.....	23
distribution of.....	45
honorary curator of.....	28
number of specimens in the collection of.....	22
papers on, in Proceedings, vol. 9.....	47
published during the year.....	49
rearrangement of the collection of.....	155
report upon the department of.....	155
review of work in the department of.....	34
sectional library of department of.....	43
temporary removal of collection of.....	24
<i>Fish Hawk</i> , collections made by the.....	80
explorations of the steamer.....	179
inshore dredging accomplished by the.....	174
Fish-hooks used by the Indians of the northwest coast.....	290
Fishing by the Indians of the northwest coast.....	297
Fishing-clubs used by the Indians of the northwest coast.....	293
Fishing-lines used by the Indians of the northwest coast.....	292
Fish rakes used by the Indians of the northwest coast.....	292
roe as food of Indians.....	276
skeletons cleaned.....	64
Fitch, John, patent for inventions granted to.....	109
Fleming, J., sends pottery from Salvador.....	74
Flemming, G., sends Indian arrows.....	67
Fletcher, Robert, member of lecture committee.....	50
Flint and steel, use of.....	577
Flint, Dr. James M., curator of materia medica.....	27, 29, 113
succeeds Dr. Beyer.....	27
Floats used by the Indians of the northwest coast.....	293
Floor plan of Museum Building.....	26
Flora of the Laramie Group, monograph of the.....	189
Florence, allusion to museum in.....	6
Florida, accessions from.....	69
information furnished to correspondents in.....	58
Folk-lore among the Indians of the northwest coast.....	378
Food collection, extent of.....	22
cooking of, among the Indians of the northwest coast.....	278
preparation of, among the Indians of the northwest coast.....	276
Foods, curator of.....	27
paper on, published during the year.....	49
Foraminifera, studies by Prof. Leslie A. Lee of the.....	52
Fordice, Morton W., paper by.....	47
Foreign countries, requests for information from.....	58
exchanges.....	46
governments, gifts from.....	18
Forney, A. H.....	60, 141
Forney, Mr., stonecutter.....	207
Forrestell, James, sends rocks.....	70-200
Forrester, George B., contributes supposed antidote for snake bites.....	153

	Page.
Fortifications erected by the Indians of the northwest coast	303
Fort Klamath, mammals from	140
Rupert, ethnological objects from	89
Fossil plants, additions to the collection of	38
catalogue entries in department of	23
collected in Yellowstone Park	38
extent of the collection of	22
honorary curator of	28
identification of, by Prof. Leo Lesquereux	52
papers on, published during the year	49
plan of exhibition series of	190
report on the department of	189
review of work in department of	37
Fox, Dr. W. H., birds exchanged with	147
presents birds	69, 71
Foxes, mounting groups of, commenced	60
France, casts of human heads from	74
ethnological objects from	90
information furnished correspondents in	58
Franklin's <i>Spermophile</i> mounted	61
Frazer on totemism	245
Freemen among the Indians of the northwest coast	251
Friedländer's catalogues	142
Fritsch, E., marble and alabaster received from	71, 200
Fuller, F. L.	207
Fulton, Robert, bust painted	63
Fungi, exhibition of	190
Funk Island, collections from, identified	52
expedition to	81, 493
result of expedition to	80
Furniture and fixtures	56
constructed in the Museum workshop, statement of	57
Fur-seal spears used by the Indians of the northwest coast	288
Gabb, Prof. W. M., fire-making appliances collected by	544
Galapagos Islands, land tortoises from the	178
visited by the steamer <i>Albatross</i>	178
Galbraith, C. S., birds purchased from	147
Gale, Denis, presents bird skins and eggs	68, 147, 151
Gaming implements	648
Gammarus, specimens of, presented by R. Ellsworth Call	174
Gardens of the Indians of the northwest coast	334
Garrison, H. S., presents fulgurite tubes	200
Gastropods, East American, revision of	162
Geare, R. I., in charge of correspondence and reports	57
Gem collection, growth of the	195
Gems, exhibition series of	25
Geognosy	201
Geographical index to list of accessions	791
review of the more important accessions	66
Geography and exploration, papers on, published during the year	49
Geological Museum in Paris, allusion to	6
Survey, U. S., co-operation of the	80
curators detailed from the	27
minerals transmitted by	196

	Page.
Geological Survey, U. S., sends rocks from New Jersey.....	71
and fossils collected in New York	71
Surveys, collections made by the	18
George Catlin Indian Gallery, allusion to	8
The, publication of.....	47
Georgia, accessions from	69
information furnished to correspondents in	58
<i>Geothlypis philadelphia</i> , eggs and nests of.....	151
Gere, J. E., sends archaeological objects and fossils.....	73
German National Zoological Museum, information sent to.....	11
Germany, information furnished correspondents in.....	58
lichens and mosses from.....	74
Gilbert, Charles H., notice of paper by	712
paper by	47
sends a collection of fishes.....	158
Gilbert, G. K., co-operation of.....	126
member of lecture committee.....	50
Gill, Mr., co-operation of.....	126
Gill, Theodore, notice of papers by.....	712
Glanville, Miss Mary, curator of Albany Museum, Grahamstown.....	162
death of.....	162
Glaze, application of, in the manufacture of porcelain	437
Glennan, Dr. P., presents a Virginia deer	216
Glover plates, overhauling of the	35, 165
Glyptodon in equus beds	127
Gobelins establishment, allusion to the	6
Godman and Salvin, insects received from	167
Godman, T. D., sends Coleoptera	67
Goldfuss, Otto, shells received from.....	74, 161
Goode, Prof. G. Brown, assistant secretary, report of.....	3
letter from J. W. Osborne to	117
member of lecture committee.....	50
notice of papers by.....	712, 713
Goss, Col. N. G., birds' eggs contributed by	33, 151
N. S., notice of paper by.....	713
presents birds	147
Government Department telegraph service	55
officials, co-operation of	10
political, among the Indians of northwest coast.....	243
Gramm, Otto, sends specimen of <i>Coregonus williamsoni</i>	157
<i>Grampus</i> , cruise of the schooner, to coast of Labrador.....	34, 80, 81, 174, 179, 181
fishes collected by U. S. Fish Commission schooner	34
identification of fishes collected by the schooner	156
southern cruise of the	155
surface towings collected by the	176
Grand Manan, once the habitat of the Labrador duck	32
Grant-Bey, Dr. James, sends collections from Egypt	66
Grant, General, deposit of war saddle of.....	29, 115
Grant relics, installation of the	65
Graphic arts, S. R. Koehler, acting curator of	27, 29
catalogue of collection of	29
statement relating to collection of	117
"Graphische Kunste," copies of, received from Hon. E. O. Graves	77
Graves, Hon. E. O., sends a collection of India proofs.....	30, 77

	Page.
Graves, M. W., coins received from	115
Gray foxes mounted	61
squirrels, group of, mounted	60
Great Auk, bones of the, secured by Mr. Lucas	81, 181
extinction of the	32
list of books and papers relating to the	524
measurements of crania of the	523
sterna of the	524
observations upon the history and anatomy of the	493
skeletal variation of the	515
Great Egg Harbor, collections from	80
crustaceans from	174
investigation of the fishes of	34, 155
Grebnitzky, N., presents specimens of natural history	68, 140, 158, 161, 174
Greece, ethnological objects from	91
shells from	74
Gregory, J. R., exchange of meteorites with	195
Green, L. W., presents ores from California	209
Greenland, ethnological material from	89
kyaks from	67
Green River Zircon Mining Company presents minerals	196
Greenup Chapter of the Agassiz Association	180
Grieve, Symington, notice of paper by	713
Griffin, Hon. G. W., sends a collection of samples of wool	76
Grinding utensils	656
Grooved axes, hammer-heads, and hammer-stones	646
Gros Ventres Indians, ethnological objects used by the	89
Groups of mammals, arrangement of	24
Guadalajara Indians, flint and steel used by the	583
Guaymas	127
Guesde, L., exchange with	46
Guimet Museum, allusion to	6
Gulf of St. Lawrence, cruise of schooner <i>Grampus</i> to the	174
Gulf Gold Mining Company	127
Gurley, Dr. R. R., field work of	183
Gymnosperms	190
Hadfield, Robert, sends manganese steel	74
<i>Hæmatopus leucopodus</i>	148
Haida dwellings	307
Indians, environment of the	235
superiority of the	236
totems of the	249
song of the	330
Hair ornaments worn by the Indians of the northwest coast	261
Halibut fishing by the Indians of the northwest coast	298
<i>Haliotis splendens</i>	129
Hall, Prof. G. Stanley, investigation of mythology by	30
investigations of	51, 88
lecture by	50
Hamilton, M., contributes reptiles	153
Hamline University, Hamline, Minn.	180
Hammers used by the Indians of the northwest coast	279
Hampe methods of determining suboxide of copper in metallic copper	39, 210
Hamy, Dr. E., exchange with	46
Han Dynasty, manufacture of porcelain during the	389

	Page.
Hanks, H. G., presents minerals	196
Hanna, H. W., sends stone implements	69
<i>Haplochiton zebra</i> , study of	156
<i>Haplodon</i> , major, skin of	139
Harnessed antelope presented	32
Harper Brothers, acknowledgment of courtesies extended by	111
<i>Harporhynchus bendirei</i> , nests and eggs of	151
<i>palmeri</i> , nests of	151
Harris, T. C. sends rocks	72
Harris, Theodore, sends fishes	71
Haskell, Dr. H. B., molds of Assyrian slabs received from	94
Hatwood, Howard, sends stone implements	72
Haupt, Dr. Paul, honorary curator of collection of oriental antiquities	27, 29, 93
lecture by	50
quotation from lecture by	95
Havre de Grace, specimens received from	80
Hawaiian Islands, canoe from	75, 76
information furnished correspondents in	58
report on birds from	32
Hawaii, Queen of, presents a canoe	75
Hawley, A. H., presents birds	147
Hawley, E. H., preparator	65
Hay, O. P., notice of paper by	713
Hayden, geological collections made under direction of	18
Hazen, Mrs. Mildred McLean, presents ethnological objects from Greenland ..	67
Head covering worn by the Indians of the northwest coast	266
Head-dress of Indian chief	264
Healy, Capt. M. A., bidarkas obtained from Alaska by	68, 77
Heath Hen, near extinction of species	32
Heating and lighting	57
<i>Helaster</i> , report on the genus	176
Helmets worn by the Indians of the northwest coast	270
Hemphill, Henry, assistance rendered by	52
correspondence with	163
presents mollusks	52
sends limpets	162
Henderson, J. G., correspondence with	163
Hendley, J. W., modeler	60-63
Henshaw, H. W., member of lecture committee	50
plants from the District of Columbia presented by	192
co-operation of	126
<i>Hepaticæ</i> , exhibition of	190
Herbert, Prof. Herbert B., lecture by	50
Herbs as food of Indians	276
Herring fishing by the Indians of the Northwest coast	299
Herron, Dr. Charles S., sends supposed antidote for snake bite	153
Herzer, H., sends fossil plants	72
Hewitt, J. N. B.	546
Hidden, W. E., sends crystals of black tourmaline	71
Higgins, Dr. C. W., sends living mammals	73
High School, Emporia, Kans	180
Hill, Charles S., transmits a collection of foreign flags	76
Hill, W. S., sends stone implements	70
Hillebrand, W. F., geological collections made by	80

	Page.
Hippisley, Alfred E., on Chinese porcelains.....	357
collection of Chinese porcelains, catalogue of the.....	442
installation of.....	25, 65
Historical geology.....	203
objects, negatives of.....	65
prints made.....	65
relics, additions to collection of.....	29
coins, badges, etc., catalogue entries in section of.....	23
collection, extent of.....	22
curator of.....	27
distribution of.....	45
report on collection of.....	115
History, paper on, published during the year.....	49
Hitchcock, Prof. C. H., relief map of Oahu received from.....	200
Hitchcock, Romyu, acting curator of textile industries.....	27
notice of papers by.....	713
on Japanese fire-drills.....	552
winged termites received from.....	766
Hobbs, W. H., sends rocks.....	70
Xochiapulco, ethnological specimens from.....	90
Hoes or digging tools.....	644
Holm, Th., redetermines the duplicate <i>carices</i>	193
Holmes, William H., honorary curator of American aboriginal pottery.....	27, 31
notice of paper by.....	713
report of.....	105
special researches of.....	105
Honduras, collections from.....	67
deer skins from.....	32
information furnished correspondents in.....	58
Hood, H. D., contributes reptiles.....	153
Horan, Henry, superintendent of buildings.....	53
Horn, Dr. George E., entomological papers presented to the library by.....	41
Horn, Dr. George H., <i>Lachnosterna</i> sent for study to.....	52, 169
Hornaday, W. T., chief taxidermist.....	60
collects elk antlers and living animals in Idaho.....	69
living animals.....	81
curator of living animals.....	27, 28, 40, 141, 213
makes collecting trip to Pacific coast.....	63
notice of paper by.....	714
papers prepared by.....	218
presents specimens of fossil wood.....	66, 73
visits Western States and Territories.....	40
Horse antelope, mounted.....	61
Hough, Walter, aid in department of ethnology.....	27
notice of papers by.....	714
on fire-making apparatus.....	531
Hondon, life cast of Washington by.....	116
House Committee on Appropriations, reference to letter addressed to the.....	20
Household boxes used by the Indians of the northwest coast.....	318
Houses, construction of, by the Indians of the northwest coast.....	305, 374
Howard University, Washington, D. C.....	180
Hoxie, Capt. R. L., presents a Virginia deer.....	78, 216
Hsiao-yao porcelain.....	406
Hsiuchou-yao porcelain.....	406

	Page.
Hsianchou-yao porcelain	407
Hsiante period, manufacture of porcelain during the	412
Hudson, Mr.	207
draughtsman	199
Hughes, Elizabeth G., papers by	47
Human beast of burden, reference to paper on	30
Human representations	668
Humpback whale, removal of cast of	140
Hungchih period, manufacture of porcelain during the	415
Hunterian Museum in London, allusion to	6
Hunting and fishing by the Indians of the northwest coast	297
Hupa Indians, fire-making apparatus of the	537
Hurter, Julius, contributes reptiles	153
Hat'ien-yao porcelain	407
Huxley, Professor, definition of a museum by	16
Hyde, G. B. and W. B., present archæological objects	67
<i>Ianthanas ianthina</i>	148
Idaho, accessions from	69
collecting trip to	81
information furnished to correspondents in	58
Illinois, accessions from	69
information furnished to correspondents in	58
State Laboratory of Natural History, lepidoptera from	167
Imperial Institute in London, allusion to	6
Increase in the number of specimens	19, 20, 23
India, bird-skins from	74
drugs from	114
ethnological objects from	91
information furnished correspondents in	58
Museum, London, allusion to	6
Indiana, collections from	69
information furnished correspondents in	58
State University sends shells	69
Indian cremation, description of	359
Office, contribution by an agent of the	79
Indians of the northwest coast, æsthetic characters of the	242
arts and industries of the	311
classification of	232
dances practiced by the	363
domestic animals of the	333
dress of the	263
dwellings of the	303
emotional characteristics of the	238
ethnical relations among the	352
festive ceremonies among the	362, 373
folklore of the	378
food of the	276
gambling among the	344
hunting and fishing by the	297
immorality among the	346
industrial organization of the	253
intellectual characteristics of the	239
medicines used by the	349
moral characteristics of the	240
mortuary ceremonies among the	351, 357

	Page.
Indians of the northwest coast, music of the.....	329
mutilations practiced by the.....	256
ornaments worn by the.....	260
personal adornment of the.....	256
physical characteristics of the.....	236
plants cultivated by the.....	333
political organization of.....	250
primitive wealth of the.....	334
productions of the.....	333
sickness among the.....	349
superstitions of the.....	348
tools used by the.....	279
trading among the.....	337
traditions of the.....	378
vices of the.....	344
war customs of the.....	340
weapons used by the.....	282
Indian Territory, accessions from.....	70
information furnished to correspondents in.....	58
India, prehistoric implements from.....	126
proofs received from the Bureau of Engraving and Printing.....	115
Industrial collections in the National Museum.....	18
organization of the Indians of northwest coast.....	253
Insects, accessions to the collection of.....	166
additions to the collection of.....	36
catalogue entries in department of.....	23
determination of.....	35
exhibit of.....	24
honorary curator of.....	28
number of specimens in the collection of.....	22
paper on, in Proceedings, vol. 9.....	47
preparation for Cincinnati Exposition in the department of.....	166, 170
preservation of the collection of.....	35
rearrangement of the collection of.....	165
report on the department of.....	165
review of work in the department of.....	35
sectional library of department of.....	43
Installation methods adopted.....	5
of collections.....	24
Interior, Department of the, co-operation of the.....	79
International exchange system, results of the.....	12
Intellectual characteristics of the Indians of northwest coast.....	239
Invertebrate fossils, catalogue entries in departments of.....	23
curators of.....	28
distribution of.....	45
exhibition space assigned to.....	25
paper on, in Proceedings, vol. 9.....	47
papers on, published during the year.....	49
Invertebrates as food of Indians.....	277
Iowa, collections from.....	70
information furnished to correspondents in.....	58
Ireland, information furnished correspondents in.....	58
prehistoric implements from.....	126
"Iron Age," aluminum bronzes presented by.....	209
Iron Cross of Germany, order of the.....	115

	Page.
Iroquois, fire-making tools used by the	546
Itah Eskimo fire-drills	560
Italy, information furnished correspondents in	58
Ives, allusion to	118
process, collection illustrating the	121
Ivory-billed woodpecker, near extinction of species	32
Jackson, E. E., sends an Indian pipe	72
Jackson, B. T., correspondence with	163
Jamaica, land shells from	160
Japan, collections received from	11, 74
Japanese fire-drills	552
Government sends its collection of birds to Washington for study ..	11
plaque repaired	63
tinder-box	585
Japan, ethnological objects from	91
information furnished correspondents in	58
Jefferson, Mary Eliza, sends arrow-heads	70
Jeffreys collection of shells	21
Jeffries, J. Amory, notice of paper by	714
Jemez Valley, pottery from	105
Jerboa rat mounted	61
John Day River, fossil plants from the region of	189
identification of fossil plants from the region of	52
Johns Hopkins University, agreement with the	29
co-operation of	19, 27, 93
Johnson, James F., prehistoric objects received from	129
Johnson, L. C., geological collections made by	80
sends fossils	70
Johuson, R. S., assistance rendered by	40, 214
Joint resolution authorizing participation in the Minneapolis Exposition ..	82
Jones, W. L., glaucophane rock collected by	200
Jordan, Prof. D. S., sends head and fins of <i>Salvelinus namaycush</i>	157
notice of papers by	714
papers by	47
sends new species of fish	158
Jouy, P. L.	159
exchange with	147
notice of papers by	714
on Korean mortuary pottery	589
presents birds	147
presents birds collected in China	74
collections made in Corea	74
Jumping-mouse mounted	61
Ju-yao porcelain	399
Kadiak, fire-making outfit from	568
Kaffir method of fire-making	554
Kaigani, description of the	385
totems of the	247
Kansas, collections from	70
information furnished to correspondents in	58
Karens, fire-making methods of the	569
Kassai River, ethnological objects from the	66
Kauffmann, Rudolph D., sends abnormal shark	158
Keach, M. A., contributes shells	72
"Keeper of the collections"	17

	Page.
Kemp, J. F., notice of papers by	714
papers published by	211
publishes metallurgical papers	52
Kentucky, collections from	70
information furnished to correspondents in	58
stone tomahawk from	90
Kessler, C. W., minerals exchanged with	196
Kew gardens, plants from, placed on exhibition	192
Kidder, Dr. J. H.	179
members of lecture committee	50
notice of paper by	715
Kimball, Hon. S. I., courtesy of	76, 77
King, geological collection made under direction of U. S. Geologist	18
Kiowan fire-making process	543
Klamath Indians, fire-making apparatus of the	536
Knives used by the Indians of the northwest coast	279
Knowles, Capt. H. M., fishes received from	72, 77
Knowlton, F. H., accompanies Professor Ward to the Yellowstone National Park	191
assistant curator of botany	37
fossil plants	28
recent plants	28
collects fossil wood	37
contributes a block of contorted schist	200
notice of reviews and papers by	715, 716
prepares report on fossil plants	52
sends fossils, plants, and stone implements	73
studies of	189
works up the flowering plants from the Yellowstone Park	192
Knowlton, James E., sends stone implements	70
Knudsen, Valdemar, presents bird-skins and bats	75, 140
Hawaiian birds	147
Koebele, Albert, insects collected by	166
Koehler, S. R., acting curator of graphic arts	27, 29, 117
notice of papers by	716
Koggiung, fire-making sets from	565
Koons, B. F.	180
Koords, fire-making outfits of the	581
Korea, common pottery used in	591
information furnished correspondence in	58
Korean mortuary pottery in the National Museum	589
catalogue of	592
Korn, allusion to	118
Kotzebue Sound, ethnological material from	89
Ko-yao porcelain	404
Kuan-yao porcelain	400
Kumlien, Ludwig, notice of paper by	716
Kummerfield, J. F., sends stone implements	70
Kunz, G. F., exchange of meteorites with	195
presents minerals	196
Kurtz, William, presents collographic prints	121
Kutchin Indians, burial customs of the	575
Labeling of mammal skulls	141
Labels for materia medica collection	114
preparation of	59

	Page.
Labrador duck, near extinction of species.....	32
expedition to.....	64
Labrets worn by Indians of the northwest coast.....	260
<i>Lachnosteria</i> , notes on the.....	170
sent for study to Dr. George H. Horn.....	52
Lafayette, General, deposit of pistols owned by.....	30, 116
<i>Lagenorhynchus acutus</i>	140
<i>Lagopus velchi</i>	148
Lake dwellings.....	627
Forest University, Lake Forest, Ill.....	180
High school, Lake, Ill.....	180
Lang, John C., original patent granted to John Fitch, presented by.....	109
Langley, Professor, quoted.....	16
Langsdorff on food of Indians.....	277
La Paz, visited by the steamer <i>Albatross</i>	178
Laramie group, monograph of the flora of the.....	189
Latta, W. J., acknowledgment of courtesies extended by.....	111
Lawrence, George N., papers by.....	47
sends birds' eggs.....	71
Lea collection of fossils.....	37
collections, value of the.....	8
Leadville, report on geology of.....	39
Leaf shaped implements.....	640
Lea, Isaac, bequest of.....	21
collection of minerals, bequeathed by.....	159, 196
mesozoic fossils in the collection of.....	187
minerals bequeathed by.....	38
work upon mollusks bequeathed by.....	35
Lecture committee, members of the.....	50
Lectures.....	50
system of popular.....	15
Lee, Prof. Leslie A.....	177, 179
in charge of scientific staff on the <i>Albatross</i>	178
studies the Foraminifera.....	52
Lee, Thomas.....	179
naturalist.....	178
shore explorations conducted by.....	180
Legion of Honor, decoration of the.....	115
Leggo.....	118
Legouia River, ethnological objects from.....	90
Lemercier, allusion to.....	118
Lemon, John H., sends stone implements and spiders.....	69
Lenguas, strike-a-light used by the.....	578
<i>Leptopilus javanicus</i>	149
Lerebours, allusion to.....	118
Lesquereux, Prof. Leo, identifies plants.....	37, 52, 189
Letters received in response to circular 36, abstract of.....	692
transmitting specimens in response to circular 36, statement of.....	687
written during the year.....	59
<i>Leucochloridium americanum</i>	162
<i>Leucosticte atrata</i>	146
Lewis, Thomas, presents minerals.....	196
Lewis, Willis, contributes supposed antidote for snake-bites.....	153
Leyden, allusion to museums in.....	6

	Page.
Libby, Prof. William, jr., lecture by	50
Library, important accessions to the	41
number of publications added to the	40
of the Museum, reference to	18
Smithsonian Institution, growth of the	13, 14
report on operations of the	40
Lichens identified by Dr. John W. Echfeldt	52
Life-Saving Service, collections received through the	76
Lilljeborg, W., notice of paper by	716
Linch-uan-yao porcelain	407
Lincoln, Dr. O., sends specimens of vanadinite	71, 196
Lindberg, J. J. E., presents black bears	214, 216
Linehan & Co., P., sends specimens of black granite	72
Linton, Prof. Edwin	179
continues studies of the parasites of fishes	177
notice of paper by	717
studies Trematode parasites	52
Lishui-yao porcelain	407
Lisiansky, description of ceremonial blanket by	265
on the Tlingit Indians	255
Lithological objects, negatives of	65
prints made	65
Lithology and physical geology, accessions to the department of	39
curator of	28
number of specimens in the department of	22
paper on, in Proceedings, vol. 9	47
papers on, published during the year	49
report on the department of	199
review of work in the department of	38
sectional library of department of	43
catalogue entries in department of	23
rearrangement of exhibition series in department of	25
Little Deer Island, researches on peridotite from	39
Living animals, catalogue entries in department of	23
care of the	62, 217
construction of house for	40
curator of	28
establishment of department of	20
extent of the collection of	22
list of accessions to the department of	220, 221, 222
collected by the curator in western states and territories	213
nucleus of collection of	25
report on the department of	213
review of work in the department of	40
transportation of	217
Loir mounted	61
London, allusions to museums in	6
fisheries exhibition, reference to collections obtained at	21
Lone Elm Smelting Works, collection from the	39
examination of ores from the	210
Lorillard collection of Central American antiquities	21
Lota visited by the steamer <i>Albatross</i>	178

	Page.
Louisiana, collection of lepidoptera from	70
information furnished to correspondents in	58
Lovett, Edward, ethnological exchanges with	88
on early fire-making apparatus	577
prehistoric implements from	74, 126
Lower Amazon, determination of birds from the	32
California, fishes of, obtained by the steamer <i>Albatross</i>	178
Silurian fossils in exhibition series	184
obtained	183
Lubbock, Sir John, concerning totemism	249
Lucas, Frederic A.	175
accompanies the <i>Grampus</i> to Labrador	81, 179
assistant curator, department of comparative anatomy	28
collects fishes	157
identification of mosses collected by	192
notice of papers by	717
obtains bones of the Great Auk	181
osteologist	64
paper by	493
presents a zebra skull	140
Lunch'ing period, manufacture of porcelain during the	417
Lunch'ian porcelain	403
Luxembourg Museum, allusion to	6
<i>Lycopodiaceæ</i>	190
Lyons museums, reference to	133
Mackenzie River, fire-hearth from the	560
Macpherson, allusion to	118
MacRae, Donald, contributes a "mad-stone"	153
Madagascar, accessions from	66
ethnological subjects from	91
Madeira, land shells from	160
Madelenian epoch	615
Madrid, allusions to museums in	6
Magdalene Island visited by <i>Grampus</i>	81
Magellan, Straits of, visited by the steamer <i>Albatross</i>	178
Magoun, George C., sends skin of Dolly Varden trout	157
Maidu negroes, fire-making by the	554
Maine, collections from	70
information furnished to correspondents in	58
rocks and minerals from	39
Malaysia, a monkey from	75
Mallery, Garrick, member of lecture committee	50
Mammal collection, card catalogue of	141
condition of the	143
exhibit prepared for Cincinnati Exposition	139
skeletons cleaned and mounted	64
skulls cleaned and mounted	64
skins, deterioration of	143
Mammalia, bibliography of works on	142
Mammals, accessions of	142
additions to the collection of	32
catalogue entries in department of	23
collected by William T. Hornaday	81
curator of	27
distribution of	45

	Page.
Mammals, groups of.....	24
living, obtained by exchange	221
purchase	221
presented	220
mounted during the year.....	61
number of species in the department of.....	22
papers on, in Proceedings, vol. 9.....	47
published during the year.....	49
photographs of	65
principal accessions to department of.....	139
report of curator of.....	139
review of work in the department of	32
sectional library of department of	43
Mandan Indians, fire-making implements used by the	545
Mandel, allusion to	118
Manigault, Dr. G. E., sends a black bear.....	216
Maori of New Zealand.....	385
Mapes, Henry, presents minerals.....	196
Marcow, John Belknap, paper by.....	47
Mardin, Assyrian seal from.....	94
Marine invertebrates, additions to the collection of	36
catalogue entries in department of.....	23
cataloguing the collection of.....	176
distribution of	36, 45, 174, 180
honorary curator of	28
investigations on.....	36
number of specimens in the collection of.....	22
papers on, in Proceedings, vol. 9.....	47
published during the year	49
report on the department of.....	173
retained in Smithsonian building	25
review of work in department of	36
sectional library of department of.....	43
special work in department of	36
Markland, General A. H., deposits war saddle of General Grant.....	29, 115
Marmot, the capture of, by the Indians of the northwest coast.....	302
Marriage among the Indians of the northwest coast.....	367
Marshall, George, sends birds	70
Marshall, H., sends birds.....	70
Marsh, O. C., honorary curator of vertebrate fossils.....	28
Marsupial, preparation of dry skin of.....	62
Martha's Vineyard, until recently habitat of Heath Hen	32
Maryland, collections from	70
information furnished correspondents in.....	58
Marx, Dr. George, <i>arachnida</i> received from	169
assistance rendered by	52
Masks worn by the Indians of the Northwest coast	270
Mason, Prof. Otis T., concerning totemism.....	250
curator of ethnology.....	27, 30
lecture by	50
member of lecture committee.....	50
notice of papers by.....	717
report of	87
Massachusetts, collections from.....	70
information furnished correspondents in.....	58

	Page.
Massachusetts, kyal lamp from	90
rocks and minerals from	39
Materia Medica, additions to collection of	29
catalogue entries in section of	23
collection, classification of the	113
extent of	22
growth of the	113
of	29
present condition of the	114
transfer of	113
honorary curator of	27
labels printed for section of	59
paper on, in Proceedings, vol. 9	47
published during the year	49
report on the section of	113
sectional library	43
Mats made by the Indians of the northwest coast	312
Matthews, Dr. Washington, member of lecture committee	50
sends ethnological objects and photographs	71
Maynard, G. W., sends copper ore	75
Maynard, W. D., sends ores	71
Mazyck, William G., paper by	47
McAllister, Joseph, sends Hymenoptera	72
McBean, Mrs. Anna C., sends ethnological objects	73
McCarthy, Gerald, plants purchased from	69
presents a collection of North Carolina plants	192
sends plants	72
McCloud River Indians, fire-making apparatus of the	537
McCormick, Dr. J. C., sends varied collections	72
McCormick, Mrs. Sarah C., sends arrow and spear heads	69
shells	70
varied collections	72
McDonald, Colonel Marshall, courtesies extended by	79
notice of papers by	711
McGee, Professor, coöperation of	126
McGlashan collection of prehistoric objects	137
McIlwraith, T., exchange of birds with	147
McNeill, Jerome, notice of papers by	717
McNiel, J. A., Chinqui pottery obtained by	74
collection of pottery from	31, 105
McPherson College, McPherson, Kans	180
McPherson, General, model of equestrian statue of	77
statue repaired	63
Medals, collection of	115
received	115
<i>Medusæ</i> , reported on, by Prof. J. Walter Fewkes	52
Meer-Kat mounted	61
Meetings of societies	50, 51
Meigs, General M. C., presents a collection of trade circulars	78
Meisenbach, allusion to	118
Mendenhall, Prof. T. C., lecture by	50
Menhirs, dimensions of	626
Menominee Indians, bow and arrows of the	90
Mercer, R. W., sends stone implements	72

	Page.
Merriam, Dr. C. Hart, birds exchanged with	147
co-operation of	182
member of lecture committee	50
moose-skin obtained through	140
notice of paper by	717
presents birds	71, 147
nests and eggs	151
Merrill, Dr. J. C., birds' eggs contributed by	33, 151
contributes reptiles	153
notice of paper by	718
presents small mammals	140
sends mammals	71
numerous zoölogical collections	72, 78
skulls of small mammals received from	181
Merrill, George P., collects rocks in Massachusetts	70
curator of lithology and physical geology	28, 38, 199
makes collections of rocks and minerals	200
notice of papers by	717, 718
paper by	47
presents boulders of glaucophane rock	68
rocks and minerals collected by	39, 70
Merrill, L. H.	207
Merriman, William B.	207
<i>Merula murina</i>	148
Mesozoic formation of North America	37
fossils, additions to the collection of	37
honorary curator of	28
extent of the collection of	22
fossils, report on the department of	187
review of work in the department of	37
sectional library of department of	43
Metallurgical specimens, distribution of	45
Metallurgy and economic geology, accessions to the department of	39
catalogue entries in department of	23
change of exhibition series assigned to department of	25
condition of the collection in the department of	210
curator of	28
labels printed for department of	59
number of specimens in the department of	22
papers on, published during the year	49
report on the department of	209
review of work in the department of	39
sectional library of department of	43
Metal working by the Indians of the northwest coast	320
Meteorites, enlargement of the collection of	195
exhibition series of	245
Mexican birds, review of	32
Government sends naturalists to Washington	11
iron meteorite, cast of	63
Mexico, accession from	67
collections received from	11
drugs from	114
information furnished correspondents in	58

	Page.
Mexico, plants from	38
pottery from	105
use of flint and steel in	580
Michigan, collection from	70
information furnished correspondents in	58
Miles, General N. A.	77
Military Academy (U. S.) sends a necklace	71, 78
decorations received	115
museum in Paris, allusion to	6
Miller, J. S., presents black-bear cubs	216
Milloué, M. L. de, exchange with	46
Mills, Robert A., sends coleoptera	69
specimen of <i>Acanthocinus nodosus</i> received from	166
<i>Mimus magnirostris</i>	146
Mineralogical objects, negatives of	65
prints made	65
Minerals, additions to the collection of	38
catalogue entries in department of	23
condition of the collection of	197
distribution of	45
extent of the collection of	22
honorary curator of	28
increase of collection of	25
papers on, published during the year	49
report on the department of	195
review of work in the department of	38
sectional library of department of	43
Ming dynasty, progress of the ceramic art during the	408
Ministry of public instruction in Paris, allusion to	7
Minneapolis Exposition, antler exhibit for	142
preparations for the	53
report upon participation of Smithsonian Institution in	82
Industrial Exposition, W. V. Cox, representative of Smithsonian Institution at	28
Minnesota, information furnished correspondents in	58
Miocene silex beds of Tampa Bay	163
study of mollusk fauna of the	35
Mississippi, collections from	70
information furnished correspondents in	58
Missouri, collections from	70
information furnished correspondents in	58
Mitchell, B. W.	60
Miyabe, Mr.	180
Mocking thrushes, Mexican and Central American, review of	150
Modelers, work accomplished by the	63
workshop, reference to the	18
Models illustrating history of transportation, series of, prepared for Cincinnati Exposition	110
of locomotives and cars deposited	109
Modern dress of the Indians of the northwest coast	265
Moki fire-tools	540
Mole rat mounted	61
Mollusks, accessions to the collection of	161
additions to the collection of	35

	Page.
Mollusks, catalogue entries in department of	23
cataloguing the collection of	163
condition of the collection of	163
distribution of	45
(including Tertiary fossils) report on the department of	159
number of specimens in the collection of	22
papers on, in Proceedings, vol. 9	47
published during the year	49
review of work in the department of	35
routine work of department of	159
schedule of registration in department of	164
sectional library of department of	43
W. H. Dall, curator of	28
Momotombita Island, antiquities from	134
Monocotyledons	190
Montana, collecting trip to	81
collections from	70
information furnished correspondents in	58
Montevideo visited by the steamer <i>Albatross</i>	178
Mont, E. W., sends ores	73
Montville serpentine, researches upon the	39
Mooney, James, collections of pottery made by	105
pottery received from	31
Moore, Lieut. William I., on Samoan fire-making apparatus	570
Moose, mounting of group of, commenced	60
skin obtained from A. B. Douglas	140
Moqui, antiquities from	134
villages, models of	133
Moral characteristics of the Indians of the northwest coast	240
Morrison, Charles F., sends birds' eggs	71, 73
Morse, Professor	115
allusion to	30
Mortars and pestles used by the Indians of the northwest coast	280
Morton, Dr. Henry, acknowledgment of courtesies extended by	111
Mortuary columns constructed by the Indians of the northwest coast	328
customs of the Indians of the northwest coast	351
Moser, Lieut. J. F., contributes reptiles	153
correspondence with	163
sends shells	162
Moss, allusion to	118
Mosses, exhibition of	190
identification of, by Prof. Charles R. Barnes	52
Motay, Tessié du, collographic prints by	121
Mountain goat skin purchased	140
Mount Vernon	116
Moustierian epoch	613
Moxley, L., presents a Grivet monkey	216
Müller, Baron Ferd. v., contributes a collection of Australian plants	191
Müller, D. August, birds purchased from	147
Mullins, W. J., presents minerals	196
sends minerals	72
Murdoch, John, librarian, report of	40
Musée d'Ethnographie, exchange with	46
Musée Guimet, exchange with	46
Musée L'Herminier, exchange with	46
Museum d'Histoire Naturelle, exchanges with	46

	Page.
Museum d'Histoire Naturelle sends casts of human heads.....	74
of Arts and Manufactures in Paris, allusion to.....	6
Economic Botany in London, allusion to.....	6
Marine Architecture in the Louvre, allusion to.....	6
Natural History and Comparative Anatomy in Paris, allusion to...	6
Naval Architecture in London, allusion to	6
Practical Geology in London, allusion to	6
the City of Paris, allusion to	6
Louvre, allusion to	6
staff	26
Musical instruments, extent of collection of.....	22
Music of the Indians of the northwest coast	329
<i>Musophaga rosæ</i>	147
Myiodon in equus beds	127
Nanfeng-yao porcelain.....	407
Nantes museums, reference to	133
National Academy of Sciences, meetings of	51
preparation for meetings of the	54
Cabinet, Congressional appropriations for maintenance of	4
of Curiosities.....	4
Gallery of Art in London, allusion to	6
Institution, organization of the.....	4
Museum, appreciation by foreign nations of.....	11
classification of materials in the	5
distribution of duplicate specimens from the	17
early history of the	4
educational work of the	16
exchanges of specimens with the	17
expenditures for purchase of specimens in the	9
extent of collections in the	8
future aims of the.....	4, 7
increase and improvement of the	7
necessity for a	6
need of money to secure collections for the	9
official recognition of the.....	15
of Fisheries in London, allusion to the.....	6
organization and scope of the.....	5, 17
papers published by officers of the	706
principal sources of the collections in the	18
progress in the work of the.....	5
publications of the, during the year ending June 30, 1888 ..	705
report of librarian of the	40
for 1885, publication of.....	47
staff of the	17, 26
table showing the number of specimens in the	22
to the Smithsonian Institution, relations of the	12
Portrait Gallery in London, allusion to.....	6
Natural History Museum in London, allusion to.....	6
history (general), papers on, published during the year.....	49
Naushon Island, until recently habitat of Heath Hen	33
Navajo fire tools	542
Indians, ethnological objects from the	89
papers prepared relating to the arts of the	88
Naval architecture, curator of.....	27
number of specimens in section of	22

	Page.
Naval architecture, paper on, in Proceedings, vol. 9	47
Navy Department, co-operation of the	79
curators detailed from the	26
Nebraska, information furnished correspondents in	58
Necklaces worn by the Indians of the northwest coast	261
Nehrlorn, A., birds exchanged with	147
Nelson, E. W., birds purchased from	147
notice of paper by	718
report on mammals by	142
Neolithic implements from Norway and Sweden	126
in America	636
period	622
Nevada, ores and rocks from	71
information furnished correspondents in	58
New Brunswick, coast of, visited by <i>Grampus</i>	81
New Museum building, necessity for a	10
Newfoundland, expedition to	64, 81
information furnished correspondents in	58
Newhall, W. H.	210
New Hampshire, accessions from	71
information furnished correspondents in	58
New Jersey, collections from	71
information furnished correspondents in	58
rocks and minerals from	39
Newlon, Dr. S. W., sends stone implements	70
New Mexico, collections from	71
pottery from	105
information furnished correspondents in	58
New Orleans Exposition, reference to collections obtained at	21
New York, collections from	71
information furnished correspondents in	58
New Zealand, fossil shells from	75
information furnished correspondents in	58
Niblack, Albert P., on the Indians of the northwest coast	225
Nien Hsi-yao, intrusted with manufacture of imperial porcelains	419
Noctuidæ, study of some genera of the	35
monograph of the	171
North American birds, near extinction of several species of	32
North Carolina, collections from	72
information furnished correspondents in	58
stone meteorite, cast of	63
Dakota, University of	180
Norway, bird skins from	75
ethnological objects from	90
information furnished correspondents in	58
neolithic implements from	126
Nose ornaments worn by Indians of the northwest coast	261
Notre Dame, University of, Indiana	180
Nova Scotia, information furnished correspondents in	58
Nowell, F. D., presents a coyote	216
Nucleus obtained for department of living animals	20
Null, James M., sends stone implements	73
Nutting, C. C., fossil coral received from	201
Nye, Willard, jr., sends paleolithic implements	70
stone implements	72

	Page.
Oceanica, accessions from	75
O'Donovan, William Rudolf	116
designer of statue of George Washington	30
"Official" drugs, meaning of	114
Ohio, accessions from	72
information furnished correspondents in	58
Valley Centennial Exhibition, exhibit of Biblical archaeology prepared for	94
Oil as food of Indians	277
Oils and gums, extent of collection of	22
Oliver, Mrs. Alice W	545
Olmsted, E. H., sends minerals	69
Ometepe Island, antiquities from	134
Opossum group in Museum	60, 141
Ord, Gen. E. O. C	77
Ordinance Department transfers war relics to Museum	116
Museum, historical objects transmitted from the	77
Oregon, collecting trip to	81
collections from	72
information furnished correspondents in	58
plants collected by Captain Bendire in	37
Organization among the Indians of the northwest coast	243
of the National Museum	17
Oriental antiquities, Dr. Paul Haupt appointed honorary curator of collection of	27, 29
organization of section of	93
reference to formation of a collection of	20
report on the section of	93
space required for collection of	25
"Original Association of Congress"	24, 115
Ornaments, ceremonial and decorative objects	648
Oryx mounted	61
Osborne	118
Osborne, J. W., co-operation of	121
letter from	117
G. Brown Goode to	120
to editor of American Lithographer and Printer from	120
Osler, Dr	180
Osteological objects, photographs of	65
preparator	64
Osteology and craniology, papers on, published during the year	49
Oswego College, Kansas	180
<i>Otocoris alpestris</i>	146
Owen, Dr. David Dale, shells described by	69
Pacific Islands, methods of fire-making pursued in the	570
Railway survey, collections of the	18
Packard, Rev. Dr. J., courtesy of	94
Packer Collegiate Institute, Brooklyn, N. Y.	180
Padre Island, rodents from	142
Paintings, drawings, and carvings of the Indians of the northwest coast	320-324
Paints and dyes, extent of collection of	22
used by the Indians of the Northwest coast	319
Pai-Ute Indians, fire-making apparatus of the	539
models of a group of	88
Paleolithic age, the	605

	Page.
Paleolithic implements in America	629
Paleozoic fossils, accessions of	37, 185
extent of the collection of	22
honorary curator of	28
review of work in department of	37
invertebrate fossils, report on the department of	183
strata, preparation of fossils from the	37
Palestine, ethnological objects from	91
Pallas's Cormorant, extinction of species	33
Palmer, Edward	127
collections purchased from	67
plants received from	38, 191
sends collections from California	68
Palmer, J.	60, 62, 63, 141
Palmer, William	60, 141
accompanies the <i>Grampus</i> to Labrador	81, 179
collects fishes	157
contributes specimens	73, 154
identification of mosses collected by	192
notice of paper by	718
presents birds	70, 147
Panama visited by the steamer <i>Albatross</i>	178
Papers describing and illustrating the collections in the Museum	223
for Museum report, based on collections	30
published by Museum officers and other investigators	48, 706
<i>Paragorgia arborea</i> , tree coral	174
Paris, allusion to museums in	6
Parke, Davis & Co., ethnological objects presented by	75
Parker, Peter	180
Parkes Museum of Hygiene in London, allusion to	6
<i>Parus gambelli</i> , eggs of	151
Passenger pigeon, near extinction of species	32
Passerine parrots, review of genus	150
Patent Museum in London, allusion to the	6
Office, contributions from the	79
Payne, Dr. A. T., sends stone implements and geological specimens	73
Peabody Accademy of Sciences sends paleolithic implements	70
Peace customs of the Indians of the Northwest coast	342
Peale, Dr. A. C., collects wood opals	70, 196
Pelseneer, Paul, correspondence with	163
notice of paper by	718
Pendants	650
Penfield, Prof. S. L., collects minerals	196
Penhallow, Mr. D. P., on the Aino method of fire-making	551
Pennsylvania, collections from	72
information furnished correspondents in	58
Railroad standard (model)	109
<i>Pentacrinus Wyville-Thomsoni</i>	174
Penydarren Works, cast tram rail	109
Perforated stones	655
Perforators	643
Perkins, Prof. G. H., sends prehistoric implements	73, 126
Perry Expedition, collections of the	18
Persian needle-work, sample of	91
Pestles and hammers	660

	Page.
Petroff on payment for injuries among Indians	241
<i>Peuceea æstivalis bachmanii</i> , nests and eggs of	151
<i>bachmanii</i>	146
<i>Pezophaps solitarius</i>	181
Pfordte, Otto F., presents minerals	196
Pharmacopœal drugs, meaning of	114
<i>Pharomacrus costaricensis</i>	148
<i>Phasianus amherstia</i>	147
Photographer, work of the	65
Photographic department in the Museum, reference to the	18
Photographs, enlargements of	65
ethnological	92
Physical apparatus, extent of collection of	22
Physiology, papers on, published during the year	49
Pictographs	661
Pierced tablets and boat-shaped articles	649
<i>Pilocarpus pennatifolius</i> , drawing of, lent for comparison	52
Pilsbry, H. A., correspondence with	163
Piney Branch, paleolithic implements from	126
Pipe-lighting outfit of the Koords	583
Pipes	662
<i>Piranga rubra cooperi</i> , eggs of	151
Pitt-Rivers, General, alludes to the United States exhibit at London in 1883	11
Plants, fossil and recent, distribution of	45
sectional library of department of	43
papers on, published during the year	49
recent, sectional library of department of	43
Playfair, Sir Lyon, quoted	13
<i>Pleurotomidae</i>	162
Pliocene beds of south Florida	163
Plummets and sinkers	652
Plymouth Institute, England	39
Pocket gopher mounted	61
Poinsett, Hon. Joel Roberts, first suggests the idea of a national museum	4
Point Barrow, fire-making outfit from	561
Hope, Alaska, ethnological material from	89
Poitevin, allusion to	118
<i>Polioptila californica</i> , eggs and nest of	151
Polished stone hatchets	645
Pollock, George F.	60
Polynesia, accessions from	75, 92
Poole on Indians of the northwest coast	253
Porcelain, antiquity of	392
composition of	435
decoration of	439
earliest mention of	388
introduction of colored decoration in the manufacture of	398
manufacture of, during five dynasties	396
origin of the word	394
paste, shaping the	437
process of baking	438
<i>Porcupine</i> , crinoids collected by H. M. S.	174
<i>Porites</i> , report on the genus	176
Portlock on foods of Indians	277
Tlingit Indians	254

	Page.
Porto Rico, antiquities from.....	135
Portraits of scientists, collection of.....	24
transferred from Smithsonian Institution.....	30, 116
<i>Porzana alfar</i>	146
Potlatches practiced by the Indians of the northwest coast.....	365
Pottery, American aboriginal, distribution of.....	45
of North American Indians.....	670
porcelain and bronzes, extent of collections of.....	22
Pouney, allusion to.....	118
Powell, Maj. J. W., geological collections made under direction of.....	18
lecture by.....	50
Prairie-dogs, mounted group of.....	60
wolves, mounted group of.....	141
Prehistoric anthropology, additions to the collections of.....	31, 125
area of exhibition hall devoted to.....	132
a study of, by Thomas Wilson.....	597
bibliography of papers on.....	599
catalogue entries in department of.....	23
curator of.....	27
exhibition hall assigned to.....	25
exhibition of collection in department of.....	132
number of specimens in the department of.....	22
report on department of.....	123
review of work in the department of.....	31
routine work in the department of.....	137
collection, geographic arrangement of.....	136
present state of.....	136
exhibit prepared for the Cincinnati Exposition.....	137
fishing, reference to.....	130
man, the discovery of.....	598
objects, arrangement of.....	135
pottery, installation of.....	31
Preparator in department of arts and industries.....	65
Preparators, work accomplished by the.....	60
Preservation of collections, appropriation for the.....	56
Pretsch, Paul.....	118
Primates, preparation of dry skins of.....	62
Primitive clothing worn by the Indians of the northwest coast.....	263
Pringle, C. G., collects plants in Mexico.....	38, 67, 191
Proceedings of the U. S. National Museum, reference to the.....	18
signatures of vol. 10.....	47
vol. 9, publication of.....	47
Progress of general and incidental work.....	40
Prong-horn antelope, mounted group of.....	60, 141
Property among Indians, inheritance of.....	254
and supplies.....	55
Proudfit, S. V., presents arrow and spear heads.....	69
sends prehistoric implements.....	126
<i>Psaltiriparus plumbeus</i> , nests of.....	151
<i>Psephotus xanthorrhous</i>	149
<i>Psittacula</i> , monograph of the genus.....	32
review of genus.....	150
<i>Ptilinopus</i>	147
Publications.....	47
describing materials in the Museum.....	5

	Page.
Publications of scientific institutions in the United States, appreciation of....	12
of the Museum during the year ending June 30, 1888.	705
Puebla, ethnological specimens from.	90
Mexico, archæological objects from.	67
Putnam, Prof. F. W., ethnological exchanges with.	88, 545
<i>Pycnonotus xanthorrhous</i>	147
Quackenbos, John D., sends fishes	157
Quimper museums, reference to.	133
Quinaiaelt Indians, fire-making implements used by the.	534
paper prepared relating to.	88
<i>Quiscalus quiscula</i>	148
Races of men, collection of representatives of.	87
installation of collection representing the.	25
Rain cloaks worn by the Indians of the northwest coast.	267
Ramage, allusion to.	118
Randolph, Col. James, acknowledgment of courtesies extended by.	111
courtesy of.	109
sill and rail given by.	109
Randolph Macon College, Ashland, Va.	180
Ransom, William, sends prehistoric objects.	126
Rathbun, Miss M. J.	175, 180
Rathbun, Richard, acknowledgment of services of.	80
continues studies of crustacean parasites.	176
honorary curator of department of marine invertebrates.	28, 36, 173
notice of papers by.	719
papers by.	47
Rattles made by the Indians of the northwest coast.	331
used by the Indians of the northwest coast.	272
Rau, Dr. Charles, bequeaths collection of prehistoric objects to the Museum. .	31
his library to the Museum.	31, 41
bequest of.	123
collection of stone implements bequeathed by.	75
death of.	27, 31, 123
investigations of.	124
notice of report by.	719
preparation of work on "Typical Forms of North American Prehistoric Relics of Stone and Copper in the U. S. Na- tional Museum"	123
Rau Memorial Library.	41
Re-arrangement of the exhibition halls.	19
Recent plants, additions to the collection of.	38
catalogue entries in department of.	23
exhibition series of.	192
extent of the collection of.	22
honorary curator of.	28
poisoning the collection of.	192
present state of the collection of.	193
report on the department of.	191
review of work in department of.	37
Red foxes mounted.	61
Redman, T. A., sends gold in quartz.	75
Red squirrels, group of, mounted.	60
Rehn, allusion to.	118
Rennes museums, referred to.	133

	Page.
Reptiles and batrachians, additions to the collection of.....	34
catalogue entries in department of.....	23
condition of the collection.....	154
curator of.....	28
number of specimens in the collection of.....	22
report on department of.....	153
review of work in the department of.....	33
distribution of.....	45
skeletons, cleaned and mounted.....	54
living, presented.....	222
purchased.....	222
papers on, in Proceedings, vol. 9.....	47
published during the year.....	49
temporary removal of collection of.....	24
Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age.....	677
Revenue-marine service, collections received from the.....	77
Review of administrative work.....	40
work in the scientific departments.....	28
Reviews published during the year.....	49
Reynolds, Elmer M., presents minerals.....	196
Reynolds, Elmer R., presents prehistoric implements.....	69, 126
<i>R. F. Stockton</i> , lithograph of steamer.....	110
Rheem, E. S.....	153
Rhees, William J., quoted.....	13
Rhode Island, accessions from.....	72
information furnished correspondents in.....	58
rocks and minerals from.....	39
Riatta-perforated stones.....	655
Rice, Hon. William T., forwards a collection of antique coins.....	76
Richards, Joseph T., acknowledgment of courtesies extended by.....	111
courtesy of.....	109
Richmond, A. G., sends stone implements.....	71
Richmond, C. W., bird exchanged with.....	148
notice of paper by.....	719
presents nests and eggs of birds.....	69, 151
Riddle, J. W., jaguar presented by.....	40, 214, 216
Ridgway, Robert, curator of birds.....	28, 32, 145
notice of papers by.....	719-721
papers by.....	47
presents birds.....	148
sends nests and eggs.....	73
Riker, C. B., birds received from.....	148
presents bird-skins from Diamantina.....	74
Riley collection of insects.....	21
allusion to the.....	8
Riley, Prof. C. V., honorary curator of department of insects.....	28, 35, 165
member of lecture committee.....	50
notice of papers by.....	721-724
visit to Europe by.....	36
Roberts, W. T., presents bird-skins.....	69
Robeson, Mrs. George M., sends arrows and arrow-heads.....	67
Robinson, Thomas, contributes specimens from the new Washington Aqueduct.....	201
Roche, allusions to.....	118
Rock carvings.....	321

	Page.
Rock Creek, paleolithic implements from	126
Rock, Professor Miles, paper read by	51
Rocks and building stones, condition of the collections of	208
stones submitted for examination	206, 207
Rock sculptures	661
Rocks, distribution of	45
list of distributions of	205
Rockwood meteorite, fragment of the	195
Rodents, preparation of dry skins of	62
Rogers, P. V., seals lent by	93
Rome, ethnological objects from	91
museums, reference to	133
Ropes made by the Indians of the northwest coast	312
Rosenbusch, Miss Carrie	207
Rovirosa, José N., presents birds	148
sends collections from Mexico	67
Rowe, W. P., presents minerals	196
Rum consumed by the Indians of the northwest coast	345
Rush, Dr. W. H., assistance rendered by	53
correspondence with	163
sends dredgings from coast of Florida	162
Russell, I. C., sends fossil plants	67
Russia, collections from	75
information furnished correspondents in	58
Ryder, John A., paper by	47
Safford, Ensign W. E., sends fishes from South America	156
studies on fishes sent by	34
Saint Germain Museum in Paris, allusion to	6
Salmon-fishing by the Indians of the northwest coast	297
spears used by the Indians of the northwest coast	288
Salvador, pottery from	74
Salvin, O., sends Coleoptera	67
Samian ware, fragments of	126
Samoa, fire-sticks from	570
San Bernardino mountains, mammal skins from	139
Diego Creek, flint implements from	126
Domingo, antiquities from	135
Sandos, W. A., sends Lepidoptera	70
Sandwich Islands, bats from	140, 142
information furnished correspondents in	58
Sandy Point visited by the steamer <i>Albatross</i>	178
San Francisco, ethnological objects from	89
mountains, mammal skins from	139
Santa Barbara, stone pipe from	89
Lucia visited by the steamer <i>Albatross</i>	178
Sargent, Prof. C. S.	192
Saturday lectures, 1882 to 1888	51
<i>Saturniida</i> , arrangement of the	169
<i>Savannah</i> , lithograph of steam-ship	110
Sawtell, Gilman, sends fishes	157
Sawyer, C. M., sends stone implements	70
Scalping as executed by the Indians of the northwest coast	341
Scandinavia, strike-a-light used in the iron age in	577
Schmid, Louis & Son, present a parrot from Cuba	73
Schoenborn, H. F., insects collected by	167

	Page.
Schreiber, W. A. H., nickel ores presented by.....	72, 209
peridotite collected by.....	200
Schuette, J. H., presents mosses and lichens	73
Schwarz, E. A., insects received from.....	69, 167
Schweinfurth, Dr., on fire-making.....	554
Scientific departments, classification of	27
review of work in the.....	28
staff of the Museum	26
<i>Sciurus bicolor</i>	140
Scollick, Mr.....	64
Scope of the National Museum.....	17
Scotland, information furnished correspondents in	58
prehistoric implements from.....	126
Scott, Alexander, contributes Greek coins.....	79
Scott, W. E. D., notice of paper by.....	724
Scrapers.....	642
Scrapers and spade-like implements.....	656
used by the Indians of the northwest coast.....	250
Scudder, Newton P., notice of paper by.....	724
Sculpturings.....	627
Seal hunting by the Indians of the northwest coast	300
Seal, William P.....	180
Sea-otter hunting by the Indians of the northwest coast	299
Sea-weed as food of Indians.....	277
<i>Sebastes marinus</i> received from Hon. E. G. Blackford.....	174
Sectional libraries	42
Seeböhm, Henry, notice of paper by.....	724, 725
presents birds.....	148
Segovia River, mammals from vicinity of.....	140
Seminoles, fire kindling by the.....	548
iron tomahawk used by the	90
<i>Semnopithecus maurus</i>	140
Seneca Indians, ethnological objects from the.....	90
Senna, Angelo, arrangement of exchange with.....	46
Sennett, George B., birds exchanged with.	148
notice of papers by.....	725
Services, amount expended for.....	56
Sèvres establishment, allusion to the.....	6
Sewall, Harold M., Samoan fire-sticks collected by.....	570
Shah of Persia sends gold-bearing quartz for analysis	76
Shalmaneser, mold from east of obelisk at	94
Shaman, burial of a.....	360
graves.....	355
cloak of, worn by the Skidegate Indians	273
Sharpe, R. Bowdler, notice of paper by.....	725
Sharpless, Prof. S. P., presents a collection of woods	192
Shell implements and ornaments.....	670
Shepard collection of meteorites	21
Shepard, Prof. Charles U., donation of books by.....	41
Shindler, A. Zeno, colorist.....	65
Shoemaker, Ernest, sends prehistoric implements.....	126
Shoenborn, H. F., presents lepidoptera.....	69
Shoshone Indians, fire-making apparatus of the.....	538
Shrew mounted.....	61

	Page.
Shufeldt, Dr. R. W., notice of papers by	725-727
presents mammals	71
sends zoölogical and ethnological objects	78
Shutt, George W., contributes reptiles	153
Siamese coat of arms repaired	63
ware, arrangement of the collection of	66
Sickle, F. E., steam-steering engine presented by	110
Siemaschko, J. Von., sends meteoric stone	75, 195
Simpson, Charles T., correspondence with	163
notice of paper by	727
sends shells	70
Sinclair, Col. P. J., presents minerals	196
Sinclair, S., exchange with	46
Singing as practiced by the Indians of the northwest coast	329
Singley, J. A., sends shells	73, 163
Sioux Indians, ethnological objects from the	89
Sitka, ethnological material from	89
fire-drill spindle from	533
Skeletal variation of the great auk	515
Skidegate Indians, shaman's cloak worn by the	273
Skinner, Dr. B. D., sends stone implements	71
Slate carvings	329
Slave-killers employed by the Indians of the northwest coast	275
Slavery, abolition of, among Indians	252
Slaves, burial of	356
Sledge Island, fire-drill from	563
Sledges used by the Indians of the northwest coast	279
Smillie, T. W., photographer	65
Smith, C. K., sends collections of stone implements	72
Smith, E. Kirby	207
Smith, Hugh M., notice of paper by	727
presents bird skins	69
Smith, John B., assistant curator of insects	28, 168
notice of papers by	727-729
papers published by	47
studies of the <i>Sphingidæ</i> and <i>Arctiidæ</i> by	170
Smith, O. C., presents male <i>Trogon ambiguus</i>	148
Smith, Prof. S. I.	178, 179
continues studies of the crustacea	52, 177
Smith, Rev. T. W., sends lepidoptera	70
Smith, Rosa, paper by	47
Smith, Sanderson	179
Smithson, allusion to	13
Smithsonian Institution, circular issued by the, concerning American aboriginal stone relics	685
co-operation of the, in an expedition to Funk Island	81
correspondence of the	15
transfers collection of portraits of scientists	116
Miscellaneous Collections, Museum publications reprinted in.	18
Smith, W. B., presents minerals	196
Smoking tubes	662
Snappers used by the Indians of the northwest coast	272
Solar, Josué Smith, sends ethnological objects	74
<i>Solenocoacha</i>	162

	Page.
Solitaire, bones of the.....	181
Solutrian epoch.....	614
Somalis, fire-sticks used by the.....	552
South Africa, shells from.....	66
South America, collections from.....	11, 74
fire-making among the Indians of.....	550
prehistoric collections from.....	134
South Carolina, accessions from.....	72
information furnished correspondents in.....	58
Southern Korea, sketch map of.....	590
South Kensington Museum, allusions to.....	6
expenditures made by.....	9
Space, assignment of.....	24
Spawn-taking, methods of, by the Indians of the northwest coast.....	299
Spears used by the Indians of the northwest coast.....	287
Specimens, amount expended for.....	56
borrowed for study.....	59
Speedwell Iron Works.....	116
Spencer, Herbert, on totemism.....	249
Spencer, Mr., (president of the Baltimore and Ohio Railroad Company), cour- tesies extended by.....	109, 111
<i>Spermophilus tereticaudus</i> , skin of.....	139
<i>Sphingida</i> , arrangement of the.....	168
study of the.....	170
Spitzbergen, plants from.....	75
Spokane Indians, ethnological objects used by.....	89
Spooner, E. H., sends rocks.....	71
Spoons used by the Indians of the northwest coast.....	317
Sprague, allusion to.....	118
Ssuchou-yao porcelain.....	406
Star-nosed mole mounted.....	61
State Agricultural and Mechanical College, Auburn, Ala.....	180
Department of, collections received through.....	76
Normal School of Nebraska.....	180
Stationery, amount expended for.....	56
Statue to Professor Baird, reference to proposition for.....	19
Stavanger Museum, bird-skins from.....	75, 148
Stearns collection of mollusks.....	21
Stearns, Dr., R. E. C.....	159
acknowledgment of services of.....	80
adjunct curator of mollusks.....	28, 35
contributes reptiles.....	153
geological collections made by.....	80
gives fossil brachiopods.....	71
Pliocene fossils collected by.....	161
presents minerals.....	196
sends collections from California.....	68
Steel daggers used by Tlingit Indians.....	285
Steinmeyer, Dr. F. H., sends stone implements.....	70
Stejneger, Dr. Leonhard, assistant curator of birds.....	28, 32, 150
continues studies upon Japanese birds.....	32
investigates European groups of birds.....	32
notice of papers by.....	730, 731
papers published by.....	47
Stephens, F., birds' eggs and nest purchased from.....	151

	Page.
Stephens, F., birds' eggs contributed by	33, 68
mammal skins received from	68, 139
Stephenson, J. A. D., presents minerals	196
stone implements	72
Sterki, Dr. V., correspondence with	163
Stevens, Francis B., acknowledgment of courtesies extended by	111
Stevens Institute, boiler deposited by the	108
Stevens, John, acquisition of boiler constructed by	108
Stevenson, Col. James, collections of pottery made by	105
on fire-making	541
pottery received from	31
Stevens, John, propeller designed and constructed by	110
Stewart, C. A., assistant superintendent	53
St. Germain Museum, reference to	132
Stimpson, W. G., aid in department of mammals	27
St. Michael's, Alaska, ethnological material from	89
Stockholm, allusion to museums in	6, 133
Stone age in Washington, preparation of paper relating to the	88
the	604
beads	649
comb used by the Tlingit Indians	260
daggers used by the Tlingit Indians	284
Stone, Miss M. L., telephone operator	55
Stone vessels for liquids	656
Stone war-clubs of Tlingit Indians	283
"Stourbridge Lion," model of the	108
St. Petersburg, ethnological objects from	91
Stratigraphical geology	203
exhibition series	39
Stratton, C. L., sends stone implements	67
Strike-a-light, description of the	574
method of using the	575
Striped dolphin presented by the U. S. Fish Commission	140
Structural geology	203
exhibition series of	39
Stuart, G	159
Students, access to collections granted to	51
Study of Prehistoric Anthropology, by Thomas Wilson	597
Stuvitz, Peter, on Funk Island	509
Subtiaba, antiquities from	135
<i>Succinea obliqua</i> , parasite of	162
Sui dynasty, manufacture of porcelain during the	390
<i>Sula brewsteri</i>	147
eggs of	151
<i>Sula gossi</i>	147
eggs of	151
Sung dynasty, porcelain first manufactured during the	396, 397
Supplies, amount expended for	56
<i>Suthora alphorisiانا</i>	147
Swan, allusion to	118
Swan, James G., on fish-hooks used by the Indians of the northwest coast	291
on tattooing among Indians	258
sends totem post and models	73
Sweden, information furnished correspondents in	58

	Page.
Sweden, neolithic implements from	126
Switzerland, information furnished correspondents in	58
<i>Synarwa</i> , report on the genus	176
<i>Syrphidae</i> , collection of, received from Dr. Williston	168
Table showing number and character of specimens distributed to 1880.....	45
of specimens distributed during the year	45
Tabulated statement showing results of responses to circular 36.....	656
"Taconic System of Emmons," preparation of paper on the	37, 184
Talbot, Fox, allusion to	118
T'ang dynasty, manufacture of porcelain during the	391
T'ang-yi-yao porcelain	406
Tanner, Lieut. Commander Z. L.	178
Tasmania, collection of wool specimens from	75
information furnished correspondents in	58
Tassin, Col. A. G., presents birds	78, 148
sends a collection of birds collected in New York Harbor ...	71
Tattooing among the Indians of the northwest coast	257
Taunt, Lieut. E. H., ethnological objects collected by	66, 79
Taxidermic work accomplished	60
miscellaneous	62
workshop, reference to the	18
Taxidermists, work accomplished by the	60
Taylor & Brunton, Messrs., ores presented by	209
send sulphide ores	68
Taylor, William, contributes reptiles	153
flint implement from	126
Taylor, Willie, sends a white eagle	73
Technological museum, Tasmania, collection of wool specimens from	75
Telegraph service, expenditures upon	57
Telephone service	55
expenditures upon the	57
Temperature charts for the Fish Commission, preparation of	176
T'engchou-yao porcelain	406
Tennessee, accessions from	72
information furnished correspondents in	58
Tertiary mollusk fauna, study of the	35
Texas, collections from	73
information furnished correspondents in	58
Textile collection, extent of	22
industries, acting curator of	27
Textiles and foods, library of sections of	44
catalogue entries in section of	23
distribution of	45
paper on, published during the year	49
Theatricals among the Indians of the northwest coast	376
Theological Seminary at Alexandria	94
Thermoties, papers on, published during the year	49
<i>Thomomys talpoides perpallidus</i> , skins of	139
Thompson, Ernest E., sends birds	67, 148
Thomson, Paymaster William J., collection of ethnological objects deposited	
by	30, 75, 79, 88
completes his report on Easter Island collec-	
tions	52
Thorpe, Dr. H. H., sends dentigerous bone	156

	Page.
Throwing-sticks, reference to paper on	30
Thrushes, Mexican and Central American, review of	150
Ticonderoga, knife with stone blade, from	90
Tilton, J. L., correspondence with	163
Ting-yao porcelain	402
Titmice, Mexican and Central American, review of	150
Tlingit dwellings	305
funeral, description of a	358
Indians, environment of the	235
gentes among the	246
Togiak River, fire-making outfit from	565
Tokyo, Educational Museum of, exchange of meteorites with	195
presents birds	148
allusion to museums in	6
educational department, exchange with	46
museum, collections received in exchange from	74
Tomlinson, Thomas	76
Tools used by the Indians of the northwest coast	279
Toovey, allusion to	118
Tappan, C., sends supposed antidote for snake-bite	153
Topics of special interest	19
Totemic columns	324
erected by the Indians of the northwest coast	307
Totemism among the Indians of the northwest coast	245
Toulouse museums, reference to	133
Townsend, Charles H., collections from Central America received from	82
collects birds	148
fishes in Honduras	156, 157
deer-skins collected by	32
insects received from	167
makes collections in Honduras	67
mammals collected by	140
naturalist	178
notice of papers by	731
presents a Mexican spider-monkey	216
studies on fishes sent by	34
Townsend, Tyler, assistance rendered by	52
Traditions among the Indians of the northwest coast	378
<i>Tragclaphus scriptus</i>	140
Transfer of disbursement of Museum appropriations	20
Transportation, amount expended for	56
and engineering, accessions to section of	108
curator of	27
report on the section of	107
space assigned to section of	25
transfer of objects to section of	108
storage	44
Traveling, amount expended in	56
"Travels through North America," quotation from	13
Treasury Department, collections obtained through the courtesy of	76
Trematode parasites, studied by Prof. Edwin Linton, of the	52
Trevino, General	77
Trevithick's first locomotive	109
Tribal society among the Indians of the northwest coast	245

	Page.
<i>Trogon ambiguus</i>	148
True, Frederick W., acting curator of comparative anatomy	28, 181
curator of mammals	24, 27, 32, 139
notice of papers by	731, 732
papers by	47
Tsimshian Indians, environment of the	235
Tung-ching-yao porcelain	405
Tunis, ethnological objects from	91
<i>Turdus celænops</i>	148
Turnbull, T. R.	210
Turner, Lucien M., notice of paper by	732
Tweed, J. W., sends stone implements	72
Tyree, J. S., gives lepidoptera	69
Unalakleet, fire-drill from	563
Underwood, L. M., sends insects	69, 72, 73, 166, 167
Ungulates, preparation of dry skins of	62
United States Express Company, courtesy shown by the	40, 217
of Colombia, information furnished correspondents in	58
pottery from	74
principal accessions received from the	67
requests for information from various parts of the	58
Upham, E. P., presents stone implements	69
Upper Silurian fossils in exhibition series	184
<i>Urinator lumme</i>	147
Uruguay, information furnished correspondents in	58
U. S. Commissioner of Fisheries	36
Utah, collecting trip to	81
information furnished correspondents in	58
mammals from	73
Ute Indian lay figures made and grouped	63
Vail, Stephen, sends piece of telegraph wire used in 1840	29, 115
Van Buren, President, allusion to	4
Vancouver Island, ethnological material from	89
Vancouver on Indian armor	268
Van Doren, W. T., sends specimens from Indian Territory	70
Vannes museums, reference to	133
Vasey, Dr., George, identifies collections of grasses	52, 193
notice of paper by	732
paper read by	51
Vermont, collections from	73
information furnished correspondents in	58
Verrill, Prof. A. E.	160, 178
continues work on Fish Commission material	173
co-operation of	177
in charge of laboratory at Wood's Holl	179
studies of marine invertebrates by	52
Vertebrate fossils, catalogue entries in department of	23
exhibition space assigned to	25
O. C. Marsh, honorary curator of	28
<i>Vesperugo hesperus</i>	142
Vienna, allusions to museums in	6
Villages of the Indians of the northwest coast	309
<i>Vireo huttoni stephensi</i> , eggs and nest of	151
Virginia, accessions from	73
information furnished correspondents in	58

	Page.
Visitors to the Museum and Smithsonian buildings since 1881, table showing	
the number of	50
during the year, number of	49
Volcano Cartago, Costa Rica	135
Von Haast, Sir Julius, exchange with	46
Voorhees, Hon. Daniel, allusion to	19
Walcott, C. D., acknowledgment of services of	80
geological collections made by	80
honorary curator of paleozoic fossils	28, 37, 183
notice of papers by	732, 733
special work performed by	37
Wales, gold in quartz from	75
Walker, Commodore John G., acknowledgment of courtesies of	79
Wallace, Prof. Alfred Russell	569
Wallis, J. G., sends rocks	68
Wallis School, Peabody, Mass.	180
Wands, ceremonial, used by the Indians of the northwest coast	271
Wanli period, manufacture of porcelain during the	417
Wapiti antlers obtained by Mr. Hornaday	140
Warblers, Mexican and Central American, review of	150
Ward and Howell, exchange of meteorites with	195
send meteoric stones	73
War Department, courtesies extended by the	77
curators detailed from the	26
transfers historical objects	30
Ward, Joseph, sends stone implements	72
Ward, Prof. H. A., Old World mammals from	140
sends fishes in exchange	156
Ward, Lester F., acknowledgment of services of	80
fossil plants	28
recent plants	28
expedition to Yellowstone Park by	37
honorary curator of fossil plants	37, 189
recent plants	191
notice of papers by	733
visits to Yellowstone National Park	191
Warren, Dr. B. H., presents birds	148
Washington, collecting trip to	81
collections from	73
Washington, George, deposit of plaster model of bronze statue of	30
pamphlet signed by	115
Washington, model of bronze statue of	116
"Farewell Address," allusion to	13
Washington, information furnished correspondents in	58
Washo, Indians of, fire-making apparatus of the	537
Watase, Sho	180
Wataveita method of fire-making	453
Watkins, J. E., appointed engineer of property	55
curator of transportation and engineering	27
report of	107
Watson, Sereno, sends Costa Rica ferns	67
Weapons of war and of the chase, used by the Indians of the northwest coast	282
Weaving among the Indians of the northwest coast	265
Webb, John S., contributes reptiles	154
Webster, Mrs. M. H., presents a parrakeet	69

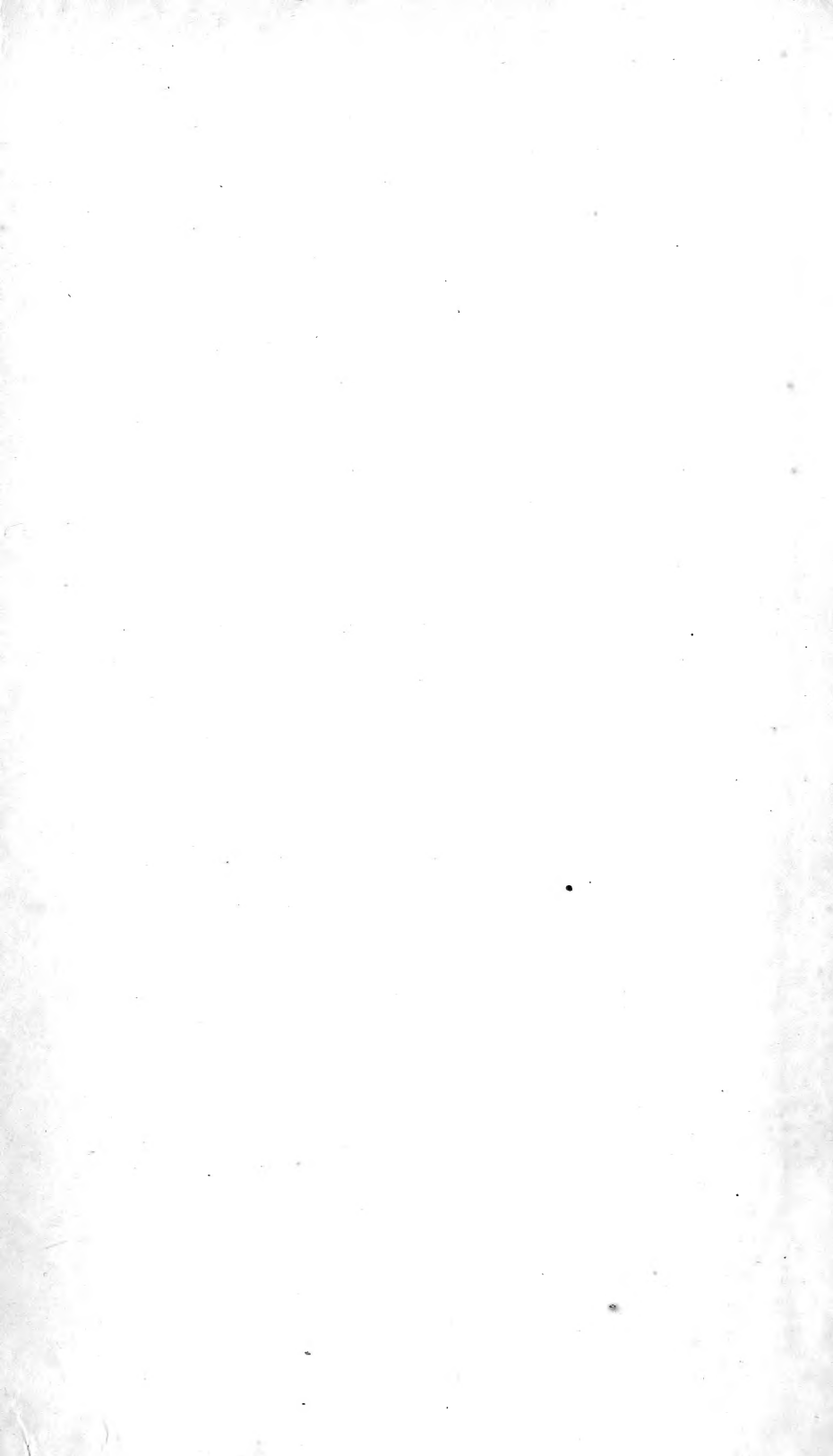
	Page.
Wedges used by the Indians of the northwest coast	281
Weeden, W. C.,	215
Wei dynasty, manufacturers of porcelain during the	389
Weld, Isaac, quoted	13
Wells, John Grant, paper by	47
Wenderoth, allusion to	118
Wesleyan University, shells received from museum of	69, 161
West Des Moines High School, Des Moines, Iowa	180
Western Greenland, fire-making implements from	559
Union Telegraph Company	55
West Indies, accessions from	73
information furnished correspondents in	58
Virginia, information furnished correspondents in	58
orthoptera from	73
Weirs constructed by the Indians of the northwest coast	294
Wheel tinder-box, description of the	578
Whistles used by the Indians of the northwest coast	272, 331
White, Dr. C. A., acknowledgment of services	80
honorary curator of mesozoic fossils	28, 37, 187
notice of papers by	733
papers published by	37
White-footed mouse, mounted	61
White, Prof. I. C., sends orthoptera	73
stone implements	72
Whitfield, R. P., correspondence with	163
Whitside, J. M., sends insects	73
Whitten, Dr. W. A., sends ethnological objects	70
Widdowson, J. W., gift of cast tram rail by	109
Wilcox, Dr. T. E., sends a short-eared owl	78
Wilcox, W. A., sends specimen of <i>Thyrstites violaceus</i>	157
Wilkes Exploring Expedition, collection of the	18
Willcox, Joseph, sends a collection of shells	69
Williams, Dr. George H., lecture by	50
seals lent by	93
Williams, Miss C. D., seals lent by	93
Williams, Rev. William Frederick	93
Williams, R. S., casts made of seals owned by	63
seals lent by	93
Williams, Talcott, seals lent by	93
Willis, allusion to	118
Williston, Dr. S. W., sends a large collection of diptera	68
<i>Syrphidæ</i> received from	167
Willoughby, Charles, on fire-making	534
sends new species of <i>Agrotus</i>	157
specimen of <i>agrotus willoughbii</i>	73
transmits a fish for identification	79
Wilson, Col. John M.	76
Wilson collection of ancient pottery, installation of the	66
archæological objects	21
Wilson Female College, Chambersburgh, Pennsylvania	180
Wilson, Sir Daniel, on fire-making by the Red Indians of Canada	549
Wilson, Thomas, ancient Indian matting by	673
coins received from	115
Wilson, Thomas, appointed curator of prehistoric anthropology	27, 31, 123
deposit of collection by	31

	Page.
Wilson, Thomas, notice of paper by	733
on prehistoric anthropology	597
on "The existence of man in North America during the paleo- lithic period of the stone age"	677
presents stone implements	71
special researehes by	31
succeeds Dr Rau	27
Wiltheiss, C. T., sends stone implements	72
Wind River Shoshones, fire-making apparatus of the	540
Wisconsin, collections from	73
information furnished correspondents in	58
Wisc, A., sends ore	73
Woodbury, allusion to	118
Wooden comb used by Tlingit Indians	260
Wood, F. E., sends plants	70
Wood, Lient. W. M., sends fishes	156
Woods, C. D., notice of paper by	734
Wood's Holl, collections from	80
made by U. S. Fish Commission at	70, 174
Woodward, R. S., member of lecture committee	50
Wood-work of the Indians of the northwest coast	320
Wooster, A. F., sends lepidoptera	68
Worthen, C. K., mammals purchased from	139
Worth, R. N., rocks received in exchange from	200
sends marbles and eruptive rocks in exchange	39
rocks in exchange	74
Worth, S. G., collects parasites of striped bass	174
sends fishes	157
Wright, B. H., correspondence with	163
mollusks presented by	161
sends Unionidæ	69
Wuni-yao porcelain	406
Wyoming, birds' eggs from	73
information furnished correspondents in	58
Wytheville Station of U. S. Fish Commission, specimens received from the	80
Yakis of Sonora, ethnological objects from the	90
Yaochou-yao porcelain	406
Yarrow, Dr. H. C., acknowledgment of services of	79
honorary curator of reptiles and batrachians	28, 34, 153
notice of papers by	734
Yeates, William S.	195
assistant curator of minerals	28, 38
minerals collected by	196
Yellowstone National Park, identification of mosses from the	52
fossil wood from the	37
Young, S. C., presents minerals	196
Yuan dynasty, manufacture of porcelain during the	407
Yühang-yao porcelain	407
Yunglo period, manufacture of porcelain during the	410
Zapatero Island, antiquities from	134
Zeledon, José C., birds purchased from	148
sends collections from Costa Rica	67
<i>Ziphius grebnitzkii</i>	140
Ziphoid whale, skull and skeleton of	140
Zoological Institute, Pavia, arrangement for exchange with	46

	Page.
Zoological Park	40
bill for the establishment of	218
Record	142
Society of Philadelphia presents a harnessed antelope	32
birds	149
mammals	75, 140
<i>Zoologischer Anzeiger</i>	142
Zulus, pipe used by	91
Zuñi Indians, model of a group of	88
villages, models of	133







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